IN THIS ISSUE

For Industrial Lighting—Don't Overlook Color Quality 59
By E. A. Linsday and J. L. Tugman

Heavy Fuel Oil—Piping, Storage and Handling 62
By William W. Gaylord

Permanent Magnets—Many Kinds for Many Jobs. *By Arlo Israelson* .. 65

How Planned Plant Engineering Works at Forstmann Woolen Plants. 68
By W. W. Starke

Now the Plant Engineer Has His Own DO-Priority 72

What's Happening in the Field? 73

Plant Engineers Form New Chicagoland Club 76

Boiler School Teaches Operators Confidence in Self and Equipment .. 77

V-Belts Can Take It, But Why Dish It Out Unnecessarily? 78
By Frank H. Rumble

Guide to Corrosion Prevention—Part II 82

'Round About with the Editors 4

Plant Engineers' Digest 24

Welding One from Three . . . General Maintenance of Hydraulic Systems . . . The Only Parking Space Left is Up . . . Sprinklers on Wheels . . . Cutting-Safety Glass . . . Pipe Conveyors Aren't Afraid of Abrasive Materials . . . Build Your Elevators on the Ground . . . Guide Wheel for Cutting Torch . . . Sugar Gets Radiant Heat Treatment . . . Industrial Fire Defense from Atomic Bombing . . . Cementing Oil Wells Calls for Special Material . . . Salvage Dollars Come from the Floor . . . Watertight Concrete . . . Unloading Raw Materials

Maintenance and Operation 44

Here's How to Solve Your Reflection Problem . . . Pipe Lengths Provide Crane Anchor for Pumps . . . Four Steps in Insulating Tank . . . Paint Identifies Wrench Position . . . Battery-Handling in Confined Space . . . For Secure Valve Wheels . . . Helical Inserts Speed Thread Repair . . . Welding Machines Hung from the Ceiling . . . Post Office Has Fewer Glass Po(i)nes, Now . . . Starting Out-of-the-way Belts . . . Can-Opener That Reflects Heat . . . Intake Water Screen Attachment

Bulletins and Catalogs .....37 — **New Products** 104
New Books .....114 — **Data File of Commercial Literature**.....120
Advertisers' Index.....138

Volume 5, No. 4 Circulation of this issue 31,959

Tyrone, Pa.

Charleston, S. C.

Luke, Maryland

in all these plants of WEST VIRGINIA PULP & PAPER Co.

Fine papers for almost every purpose—papers that add their persuasive influence to the printed word, beauty to packages and ruggedness for protection; these are West Virginia's products. The Ohio Injector Company considers it a compliment that OIC Valves share in their production.

OIC Valves are *precision engineered* and *precision built,* providing efficient control of flow of air, gases and liquids. And where plant designers and builders need assistance in selecting valves best suited to each use, OIC engineers offer *precision application* help.

Ask your local OIC distributor for a free copy of the OIC Valve Cross-Reference Chart. Or write direct to The Ohio Injector Company, Wadsworth, O.

OIC
FOUNDED 1883

VALVES

FORGED AND CAST STEEL · IRON · BRONZE

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Photo courtesy Millers Falls Paper Co.

Where B. F. Goodrich grommet belts lasted 8½ years

B. F. Goodrich grommet V belts cut costs 20 to 50%

GROMMET V belts (made only by B. F. Goodrich) handled a transmission job on this drive 24 hours a day for 8½ years. The service is rough—starting causes shock loads, pulsations. The drive is fully equipped with B. F. Goodrich grommet V belts—here's where that extra strength and longer life come from:

No cord ends—A grommet is endless, made by winding heavy cord on itself to form an endless loop. It has no overlapping ends. Because most of the failures in ordinary V belts occur in the region where cords overlap, the endless cord section in a grommet V belt eliminates such failures.

Concentrated cord strength—All of the cord material in a B. F. Goodrich grommet multiple-V belt is *concentrated* in twin grommets, positioned close to the driving faces of the pulley. No layers of cords to rub against one another and generate heat; cord and adhesion failures are reduced.

Better grip, less slip—Because a grommet is endless, a grommet V belt is more flexible, grips the pulleys better. Size for size, grommet multiple-V belts will give ⅓ more gripping power, pull heavier loads with a higher safety factor.

Only B. F. Goodrich has the grommet!—No other multiple-V belt is a grommet V belt (U. S. Patent No. 2,233,294).

Now available in C, D and E sections. See your local B. F. Goodrich distributor. Ask him to show you his "X-ray" belt that illustrates grommet construction clearly. *The B. F. Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

Grommet V Belts BY
B.F.Goodrich
RUBBER FOR INDUSTRY

Tool experts, like the Ratchopper, are "hopped up" over PROTO. Reason No. 1 is that PROTO tools are truly professional—designed right, made from special steels, and scientifically heat treated. Another reason is that proper tools are available for almost any job. Choose the *professional* tools you need from your PROTO dealer's big selection.

Send 10¢ for 68-page catalog to

PLOMB TOOL COMPANY
2274K Santa Fe Ave.
Los Angeles 54, Calif.

TOOLAGRAM
Striking Wrench
Spud End Wrench
Work-saving PROTO heavy-duty industrial tools include many types of wrenches and sockets in addition to those shown.
5185
PROTO TOOLS
LOS ANGELES

'ROUND ABOUT with the editors in field and office

Priority System Q & A Book

TO ANSWER THE questions most frequently asked, the NPA has prepared a 14 p pamphlet titled Inventory Control and Priorities—Answers to 85 Questions. The booklet also has a list of departments and department heads and a complete directory of the 85 field offices each equipped to give first hand detailed information and assistance. The booklet can be obtained by writing to The National Production Authority, Department of Commerce, Washington 25, D. C.

Here's a Man With a Problem. Can You Help?

OUR CORRESPONDENCE indicates a wide interest in statistical data dealing with the size of a plant engineering department in relation to the size of the plant as a whole. The following letter from a reader is typical:

"Do your readers have statistical data as to the percentage of plant engineering or maintenance employes to the total plant population. At the moment I am particularly interested in the number of janitors either as a percentage of the total plant population or per unit of floor area.

"We are concerned with determining a reasonable size of a janitor force for a plant of our type. Our present force consists of a total of 189 employes including supervision and special process workers on chemical tanks and spray booth cleaning. Approximately 150 are actually janitors.

"Our plant consists of a total floor area of slightly over 4,000,000 square feet, approximately 3,500,000 square feet being air conditioned office, engineering and factory floor space.

"In addition, we have the large parking lots and somewhat over 100 acres of paved yard areas utilized mostly for storage of raw materials. At present, plant population exceeds 26,000 and is carried primarily on a two-shift basis but with a sizable and growing third shift.

"We have a plant engineering department force, including maintenance and janitors, of approximately 780. Our functions are roughly the procurement of all plant productive equipment, design of all plant extensions, manufacturing aids, production processes, construction of all work platforms, load bars, handling devices, office partitions, storage bins and racks, etc., and the maintenance of all machinery, equipment, buildings and grounds as well as the operation of utility systems including the boiler house and air conditioning system."

EDITOR'S NOTE: Plant Engineering will be glad to receive replies or comments on this subject. Data will be tabulated and the tabulations showing practice in different industries in different size plants will be summarized and sent to all those who participate in the collection data. All replies will be considered confidential and company names, plants, or locations will not be disclosed.

The data should include the type of industry, total number of employes, plant area in square feet, and a breakdown of the plant engineering activities into different sections with the scope of the work outlined briefly. For instance does janitorial work include only sweeping and mopping or does it include other activities such as machine chipping, scrap segregation, or other special services.

News of the Plant Engineer's Clubs

ON FEBRUARY 15 the San Francisco Plant Engineer's Society met in San Francisco. The program, arranged by Fred Reibin, was highlighted by a paper delivered by N. E. Zavalishin of W. P. Fuller & Co. Mr. Zavalishin, a specialist on paints and painting practice, discussed the practical application of paints to wood, metal and masonry surfaces.

The March meeting, held the 23rd in Oakland, was relatively short, devoted to a general discussion of plant engineering problems. The meeting was adjourned early so the club members could attend the Metals Show held in Oakland that week.

Open Letter to Industry— Need for Paperboard Scrap

AS YOU MAY know, a severe shortage of waste paper, especially old corrugated boxes, brown wrapping paper and bags, exists today. Unless the supply of these Kraft pulp substitutes is increased, the supply of paperboard will become even more acute.

Old corrugated boxes, Kraft papers and bags are the best sources, next to wood pulp, of strong fibre materials needed for the manufacture of paperboard products.

More old corrugated and Kraft will be needed for paperboard manufacture during the months ahead. This is reflected in government re-

(Continued on page 140)

Plant Engineering is published monthly at Chicago, Ill. Subscriptions one year $10 in the U. S. A. Canada $11; Elsewhere $12. Acceptance under Section 34.64 P. L. & R. authorized by Post Office.

THE EVIDENCE IS OVERWHELMING!

ARMSTRONG TRAPS GIVE UNEQUALLED RESULTS

NEED FOR NEW BOILER ELIMINATED after installing Armstrong traps on canning equipment . . . *Bestovall Canning Co., Vancouver, B. C.*

50% DECREASE IN HEAT-UP TIME of plating coils . . . *Proctor Electric Co., Philadelphia, Pa.*

15% GREATER PRODUCTION since unit trapping with Armstrongs . . . *Sun Ray Cleaners, Chicago, Ill.*

NO REPAIRS IN SIX YEARS ON 250 Armstrong traps . . . *Plymouth Shoe Co., Middleboro, Mass.*

20% FUEL SAVINGS after trapping heating coils individually . . . *Norton Greenhouses, St. Paul, Minn.*

SAVING 14 TONS COAL PER MONTH with Armstrong traps . . . *M. Wile & Company, Buffalo, N.Y.*

30% LESS MAINTENANCE on traps on low pressure heating system . . . *John Deere Harvester Works, East Moline, Ill.*

BETTER QUALITY WORK since trapping laundry equipment with Armstrongs . . . *Soft Water Laundry & Cleaners, Long Beach, Cal.*

40° HIGHER TEMPERATURES in flatwork ironer rolls . . . *Peter Bent Brigham Hospital, Boston, Mass.*

40 MINUTES FASTER HEAT-UP in drying oven since Armstrong traps were installed . . . *Emerson Drug Co., Baltimore, Md.*

DRIER HEAT-UP TIME CUT 2-3 HOURS with six Armstrong traps . . . *Industrial Grain Products, Fort Williams, Ontario.*

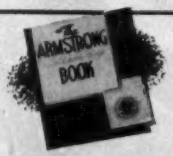
SAVES 3728 GALLONS FUEL OIL first year Armstrong traps were installed . . . *Mary Lincoln Candies, Buffalo, New York.*

YOU CAN confidently *expect* results like those listed at the left when you install Armstrong steam traps because:

- No steam loss, hence steam and fuel savings and less return line back pressure.
- Air is vented automatically along with condensate, assuring maximum temperature, less corrosion.
- Valve and seat are chrome steel, hardened, ground and lapped—good for temperatures to 900°F, 950 psig, they last for a long, long time at lower pressures.
- Valve lever assembly and bucket are 18-8 stainless for long wear and corrosion resistance.
- Nothing to stick, clog, leak or collapse.
- Dirt is washed right through by swirling action of the condensate.
- There is almost no friction between moving parts.
- The valve is either wide open or tight closed—no wire-drawing, no dribbling, less wear.
- Condensate is discharged at steam temperature, keeping units at top temperature.

Why have less? Order your Armstrong traps now.

ARMSTRONG MACHINE WORKS
912 Maple Street • Three Rivers, Michigan



SEND FOR THE 36-PAGE STEAM TRAP BOOK FOR COMPLETE DETAILS

SEE OUR CATALOG IN SWEETS OR CEC

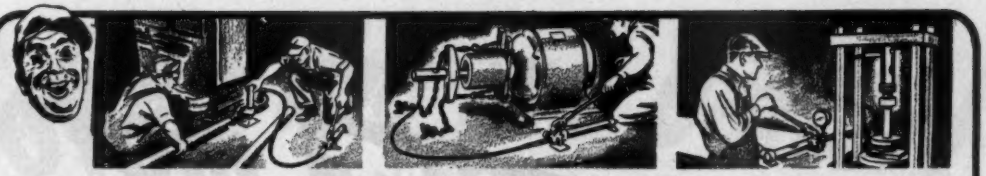
ARMSTRONG STEAM TRAPS

Man-Alive! this Hydraulic Jack

DOES EVERYTHING

but walk and talk!

It's a "Porto-Power" Jack! It's remotely controlled . . . it's all directional . . . and it can do "1001" tough jobs. You'll be positively amazed at the time, trouble and money it saves!



LIFT Lift from a low of 1½". Save up to 9 hours or more in moving and re-settling a machine with this "Porto-Power" toe-lift setup.

PULL Standard attachments quickly harness the ram to pull with FULL power. Pull wheels, gears, pulleys — no prying or sledging.

PRESS Mount the "Porto-Power" ram in a home-made press or a standard "Porto-Power" bench press. Ram is easily removed.

CLAMP Clamp parts for welding, riveting or other operations. Combinations build up for short or long spans.

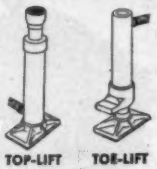
BEND Bend monorail, straighten shafts — apply hydraulic power how, where and when you want it!

PUSH Push out pins, bushings, etc., with this or other versatile "Porto-Power" combinations.

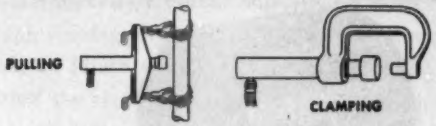
Here are just a few of the many "Porto-Power" COMBINATIONS

Standard attachments and the ram are threaded for easy, fast assembly.

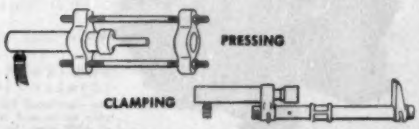
A sturdy high-pressure safety hose connects the ram to the portable hydraulic pump.



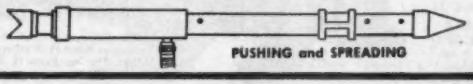
TOP-LIFT TOE-LIFT



PULLING CLAMPING



PRESSING CLAMPING



PUSHING and SPREADING

"Porto-Power" eliminates all this . . . conserves valuable manpower!

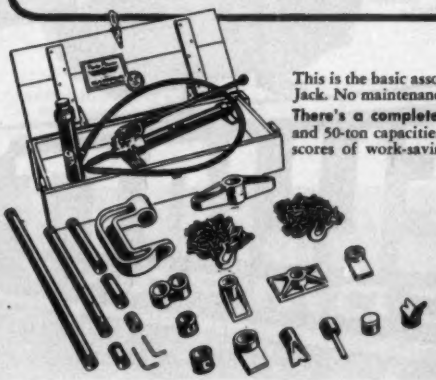
OUT goes dangerous blocking up.

OUT go inconvenient, time-taking operations.

OUT goes damaging hammering and prying.

OUT goes excessive use of heat.

OUT go costly and varied mechanical devices.



Every plant needs the S31 KIT

This is the basic assortment of "Porto-Power" attachments and the 10-ton "Porto-Power" Hydraulic Jack. No maintenance crew can afford to be without it! It pays for itself on one or a few good jobs.

There's a complete line of "Porto-Power" equipment! Rams are available in 2, 4, 7, 10, 20 and 50-ton capacities and a range of sizes . . . with hand-operated or motor-driven pumps . . . plus scores of work-saving attachments for maintenance, production or laboratory work.

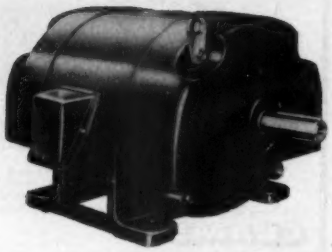
Blackhawk Mfg. Co., Dept. P4941, Milwaukee 1, Wis.

Porto-Power

is the exclusive (trade name registered) product of

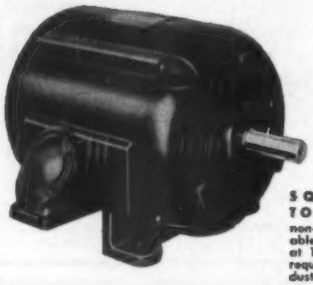
BLACKHAWK

The RIGHT motor



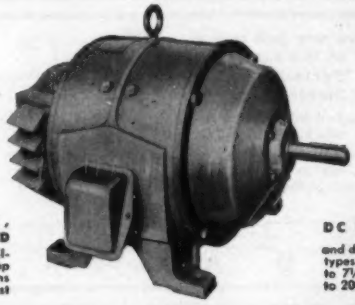
SQUIRREL-CAGE SPLASHPROOF

Form BA. Has corrosion-resistant covers which prevent entrance of splashing liquids.



SQUIRREL-CAGE, TOTALLY-ENCLOSED

non-ventilated Form BE. Available up to and including 3 hp at 1800 rpm, for applications requiring protection against dust, fumes, moisture.



DC DRIPPROOF

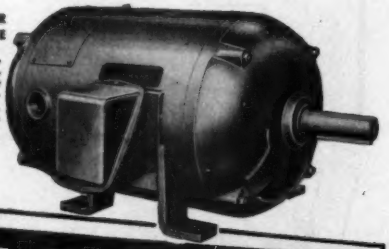
and drippproof-protected types Form F, in ratings to 7½ hp. Form H, 10 to 200 hp.

SQUIRREL-CAGE PROTECTED TYPE

Form BA. An open drip-proof motor for general purpose use. Available in wide modifications to meet a variety of conditions.

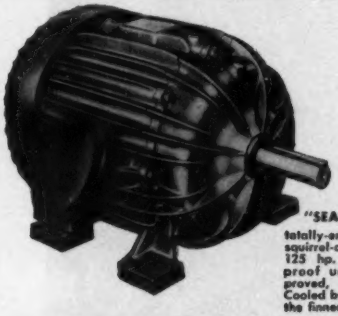
WOUND-ROTOR PROTECTED TYPE

Form BW. For slow, smooth acceleration, high starting torque with low starting current, or variable speed. Drip-proof, splash-proof, 1 to 200 hp.

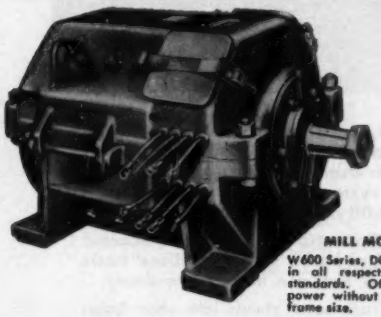


ELLIOTT COMPANY

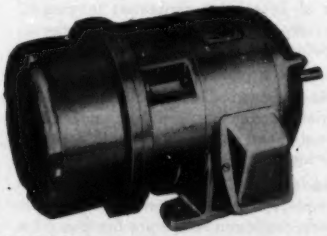
does the job better!



"SEALEDPOWER" totally-enclosed fan-cooled squirrel-cage motors, 3 to 125 hp. Also explosion-proof underwriter's-approved, 20 to 125 hp. Cooled by air blown along the finned outer case.



MILL MOTOR, W600 Series, DC. Conforms in all respects to AISE standards. Offers more power without increase in frame size.



BRAKE MOTOR using latest disk type brake mounted on BA drippproof motor. Also available with totally enclosed and splashproof enclosures for AC or DC applications.

Take your pick of these ELLIOTT CROCKER-WHEELER INTEGRAL MOTORS

from 1 to 200 hp

■ NAME YOUR POISON—is it dust, dirt, corrosive fumes, explosive hazard, water in fog, in drops, in a deluge—is it heavy duty, normal duty, limited motor space, high starting torque, etc., etc. Whatever the condition, an Elliott Crocker-Wheeler motor will prove itself the *right* one for the job—*right* not only because it is designed for the conditions of your drive, but also because it has behind it names that for many years have meant quality motor performance.

GET FULL INFORMATION about the C-W motor you need. Tell us your drive problems and we will be glad to send informative bulletins on the motors indicated.

NEED LARGER MOTORS? Looking for a really big motor—big in quality as well as capacity? You'll find it in the Elliott "Fabri-Steel" line, which employs the modern technique of electric welding in the achieving of greater strength, rigidity, lightness, and adaptability, with long life and easy maintenance. Bulletin on request.

Address Your Request for Bulletin to
Dept. F, ELLIOTT COMPANY, JEANNETTE, PA.

CW-22

★

DEMPSTER DUMPSTER SYSTEM

SERVING COST-MINDED MANAGEMENT FROM COAST TO COAST

. . . handling bulk materials of every description at phenomenal savings

Photos show the three simple stages of servicing a container. The Dempster-Dumpster, operated from hydraulic controls in the cab by one man, the driver, picks up each container, places it in carrying position, and hauls it to point of disposition where it may be dumped or set down intact.

● **The General Electric Company, well known for sound management, is among the hundreds of cost-minded manufacturers using the Dempster-Dumpster System of bulk materials handling . . . the system recognized across the nation for its efficiency and ability to reduce costs!**

Cuts Cost of Equipment and Operation — One truck-mounted Dempster-Dumpster performs the work of from 3 to 5 conventional trucks . . . reducing investment, maintenance and man hours tremendously.

Eliminates Standing Idle Time—Truck never stands idle while being loaded nor do loading crews stand idle while truck makes haul. One Dempster-Dumpster services any number of detachable containers ranging in size up to 12 cu. yds. and in a wide variety of designs best suited to the type of materials handled—be they bulky, light or heavy . . . solids, liquids or dust . . . trash or rubbish.

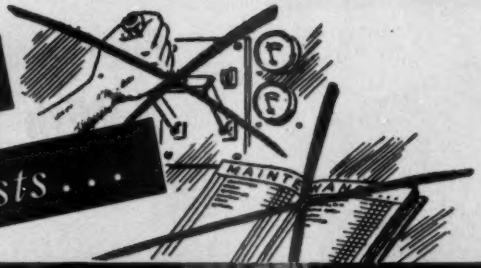
Eliminates Re-Handling of Materials—Dempster-Dumpster Containers are placed at the very spot where materials accumulate—inside or outside buildings. Materials placed in these containers remain there until taken to destination and dumped or set down intact.

Increases Efficiency, Sanitation and Good "Housekeeping"—The Dempster-Dumpster System is a complete, unified plan for plant-wide cleanliness. Containers built to handle trash and refuse are fire-proof, rat-proof and fly-proof. Contents cannot be scattered by wind or scavengers. Regardless of your particular materials handling problem . . . raw products, finished products, trash or rubbish—it will pay you to investigate the Dempster-Dumpster System now! A product of Dempster Brothers, Inc.

One Dempster-Dumpster Services All Containers. . . All Designs. . . All Sizes

DEMPSTER BROTHERS • 141 Shea Building • Knoxville 17, Tennessee

No Shutdowns . . .
No Repair Costs . . .



IN 30 MONTHS OF STEADY OPERATION!

Three Worthington YC-2 Compressors on general air service in the Reo Motors Company Plant, Lansing, Michigan. Two of these units ran for 2½ years, the other (a later installation) for 2 years, before all three had their first routine examination. During that time they operated approximately 16 hours per day, 5 days per week, without a single shutdown for maintenance.

Worthington YC-2 Compressors Provide Reo Motors Plant With Trouble-Free, Low-Cost Air Service

Freedom from maintenance worries is just one of the many advantages you get with Worthington YC-2 Compressors. Installation is quick, easy and inexpensive. A YC-2 comes completely assembled — there's no alignment problem and you don't need an erecting engineer. Requiring only half the space and one-quarter the foundation of same-capacity horizontals, it's ready for work as soon as connections are completed — at big savings in time, labor and money.

You get steady savings on operating costs, too, thanks to advanced features like the balanced Y-frame for higher rpm . . . the power-thrifty, instantly responsive 3 and 5-step variable capacity control . . . and Worthington Feather* Valves, most efficient and economical ever made.

GET ALL THE FACTS

on how YC-2's can cut your air costs — from the first day on! Bulletin L-667-B1A gives you the whole economy story with further proof that *there's more worth in Worthington.* Write to *Worthington Pump and Machinery Corporation, Compressor Division, Buffalo, New York.*

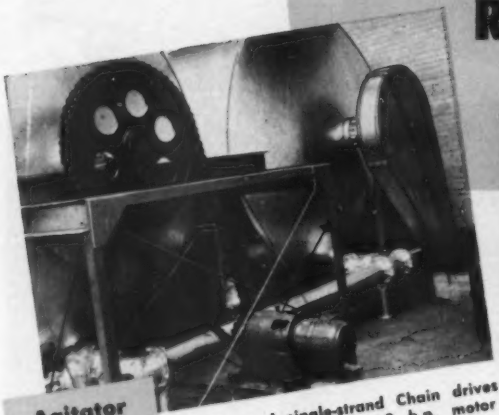
WORTHINGTON

NO OTHER COMPRESSOR WILL OUTPERFORM A WORTHINGTON

*Reg. U.S. Pat. Off.

80.4

Everyday Shop Jobs Done Better With DIAMOND Roller Chains

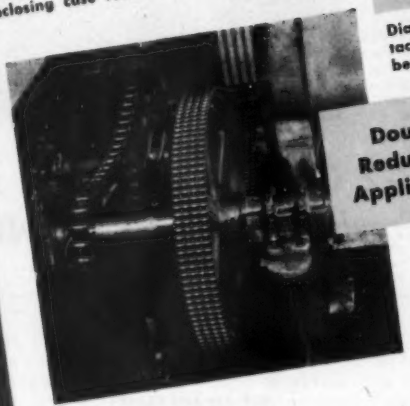


Agitator Drives In Can Company

A Diamond single-strand Chain drives agitator shaft from a 3 h.p. motor Shown with enclosing case removed.

For Power Transfer and Conveyor Flight

Diamond Roller Chain with attachments carry conveyor slats between.



Double Reduction Application

Quadruple Diamond from motor and single from jackshaft to mixer provide simple, double reduction unit.

A Simple Drive in Distillery

Here's a plant-executed Diamond application using single strand chain from jackshaft.

Catalog 709 has 48 pages of data useful to plant men—a copy is yours for the asking.

● In your shop there are many everyday jobs where power transfer is required, from motors or engines to main shafts, shafts to shafts,—for conveyor operation and miscellaneous purposes.

Diamond Roller Chains, in single and multiple strands, in pitches from ¼ in. to 2½ in., offer wide choice for the majority of plant jobs. They meet speed requirements, don't slip or creep, have high efficiency of 98-99%, and because of uniform high quality, reliably insure long-life high-output performance with little or no maintenance or replacement trouble.

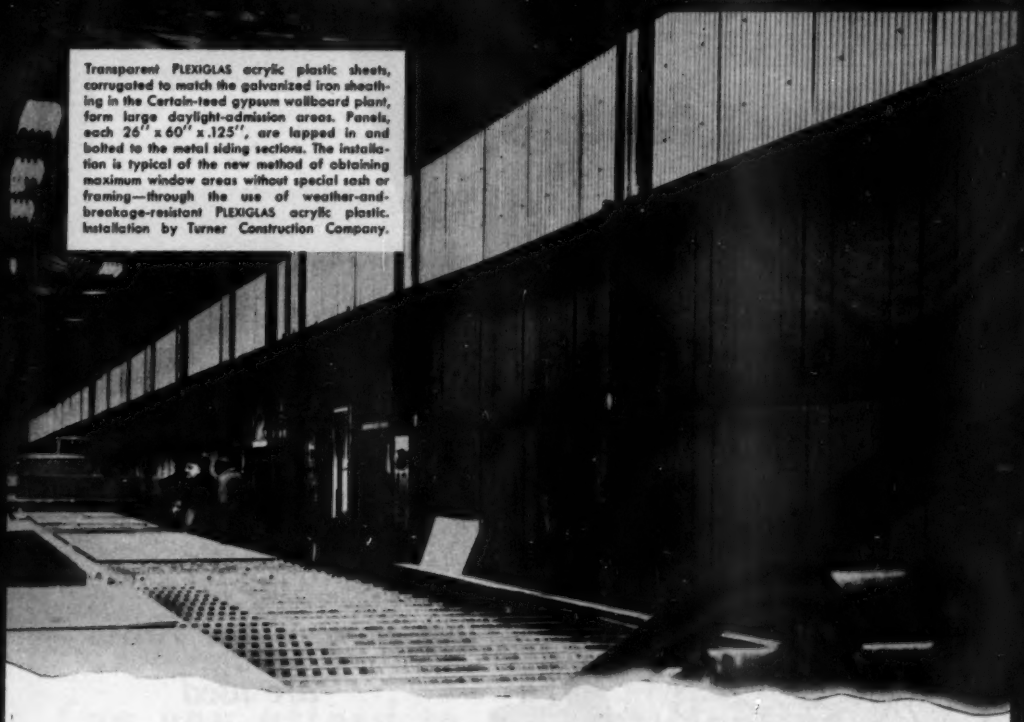
DIAMOND CHAIN COMPANY, Inc.

Dept. 614, 402 Kentucky Avenue, Indianapolis 7, Indiana

Offices and Distributors in All Principal Cities

Refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER

DIAMOND **ROLLER CHAINS**



Transparent PLEXIGLAS acrylic plastic sheets, corrugated to match the galvanized iron sheathing in the Certain-teed gypsum wallboard plant, form large daylight-admission areas. Panels, each 26" x 60" x .125", are lapped in and bolted to the metal siding sections. The installation is typical of the new method of obtaining maximum window areas without special sash or framing—through the use of weather-and-breakage-resistant PLEXIGLAS acrylic plastic. Installation by Turner Construction Company.

Good Idea in Industrial Glazing . . .

Sashless, Frameless PLEXIGLAS Windows

PLEXIGLAS acrylic plastic windows stretch for hundreds of feet in Certain-teed Products' Fort Dodge (Iowa) plant. Yet there's not a sash or frame in the whole installation! The corrugated PLEXIGLAS panels are *part of the wall*—simply lapped in and fastened to the metal siding.

Light weight, strength and resilience make this money-saving method possible. PLEXIGLAS weighs less than half as much as glass, yet withstands hard blows and heavy stresses. You get extra benefits, too—full, even daylighting through light-diffusing white translucent PLEXIGLAS—fast, easy installation—safety and low-cost maintenance.

Clear transparent and white translucent PLEXIGLAS have *many* glazing applications—in skylights, doors, partitions and conventional windows. Users find it especially valuable in high-breakage areas or those difficult to daylight. We'll be glad to send you full particulars upon request.

A steadily increasing percentage of PLEXIGLAS production, now at record levels, is required for the defense mobilization program. The supply available for civilian applications is limited.

CHEMICALS FOR INDUSTRY

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

PLEXIGLAS *is a trade-mark, Reg. U. S. Pat. Off. and in principal foreign countries.*

Canadian Distributor: Crystal Glass & Plastics, Ltd., 54 Duke Street, Toronto, Ontario, Canada

piping repairs cost more now!

No. 480 Iron Body Clamp Gate

You make them less often by using Dependable Quality

CRANE VALVES

...That's why more Crane Valves are used than any other make

easy access prevents trouble with this valve

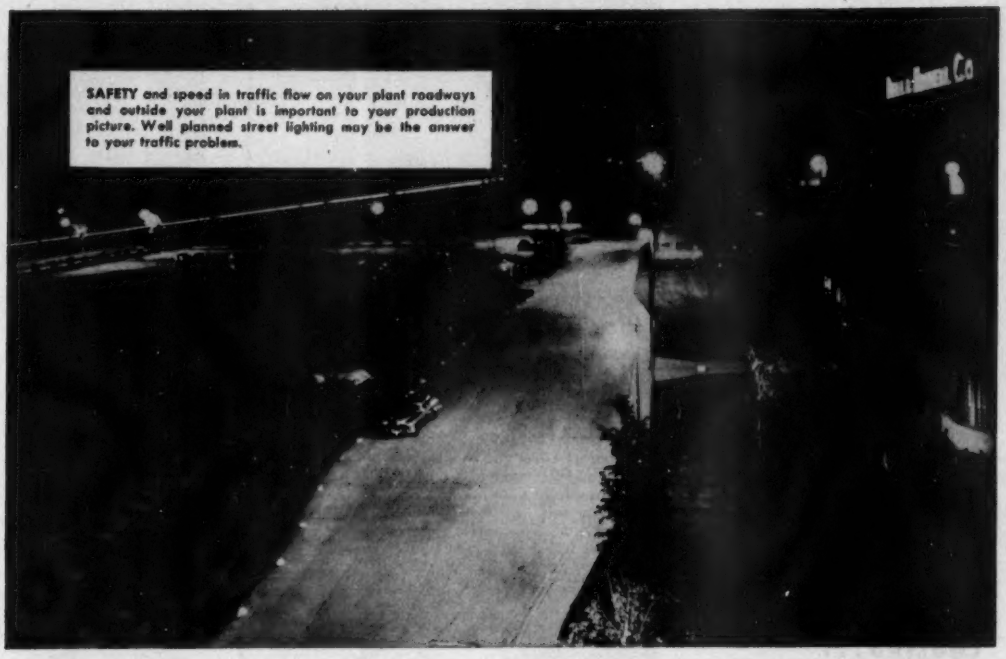
Remove just two nuts to dismantle this gate valve for inspection, cleaning, or repairs—without taking it from the line. Reassemble just as easily, knowing that Crane clamp design keeps the bonnet joint snug and accurately aligned. Use Crane Clamp Gates on steam, water, and air, but especially in heavy fluid lines needing periodic cleanout. They'll save time, labor, and encourage regular servicing that prevents valve trouble.

Combining easy access with highly dependable service features, Crane Clamp Gates typify Crane Quality—*better valve performance at lowest ultimate cost.*

CRANE

CRANE CO., *General Offices:*
836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING


SAFETY and speed in traffic flow on your plant roadways and outside your plant is important to your production picture. Well planned street lighting may be the answer to your traffic problem.

Can you afford to neglect Lighting on your outdoor production lines?

As production becomes the key word in today's industrial picture, you are again faced with the problem of "keeping 'em rolling" from entrance gate to railroad siding.

Plan now to keep the out-of-doors elements of your plant at peak operation with soundly planned outdoor lighting. New types of fixtures, improved lighting techniques, minor adjustment of your present lighting equipment can give you a completely modern system at moderate cost.

For planning help call in the lighting specialist at your local G-E office. He is trained in today's lighting requirements and techniques. Or write for the free bulletin *Outdoor Lighting for Industrial Plants. (GEA-3640.) Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

SPEED is becoming the vital factor in production and distribution. For a modest investment outdoor lighting can add speed to your operation.

PROTECTION offered by fences and walls can be doubled by adequate protective lighting. Give your plant the protection of a complete lighting system.

GENERAL ELECTRIC

451-161

American Blower . . . a time-honored name in air handling

Toledo, too, has a conveniently located American Blower Branch Office to provide you with data and equipment for air handling. You can reach American Blower in Toledo by calling Lawndale 7297. In other cities, consult your phone book.

COOLING . . .

American Blower's reputation for high quality has made them an important source of supply for many original equipment manufacturers. A leading maker of refrigeration equipment, for example, relies on American Blower almost exclusively for the fans and blowers used in his units. As he says: "We know refrigeration. You know air handling. Together, our teamwork and high standards of quality results in an end product second to none." Can you use the American Blower team in your field?

HEATING . . .

Being able to eliminate a central heating system with self-contained gas-fired unit heaters is a big advantage in those small but neat new stores and shops springing up everywhere. American Blower Gas-Fired Unit Heaters are not only highly efficient but harmonize beautifully with modern interiors. A.G.A. -approved, they are available in a wide range of sizes to meet many different commercial needs. Our nearest branch office will give you complete data and prices.

VENTILATING . . .

As an added sales feature for new homes and multiple dwelling units, builders find American Blower Aeropel Fans a natural. One builder recently installed 300 in a housing project. Found the response so good he's making them a standard feature. Aeropel Fans have won two Fine Arts Awards for beauty and utility in the home. They're ideal for ventilating kitchens, basements, recreation and utility rooms—are reasonably priced and easy to install.

MAY WE SERVE YOU?

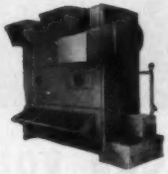
American Blower heating, cooling, drying, air conditioning and air handling equipment can do much toward improving comfort and efficiency in business. For data, phone or write our nearest branch office.

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO

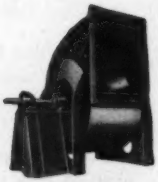
Division of AMERICAN RADIATOR & Standard Sanitary CORPORATION

Unit Heaters

Ventura Fans



Air Conditioning Equipment

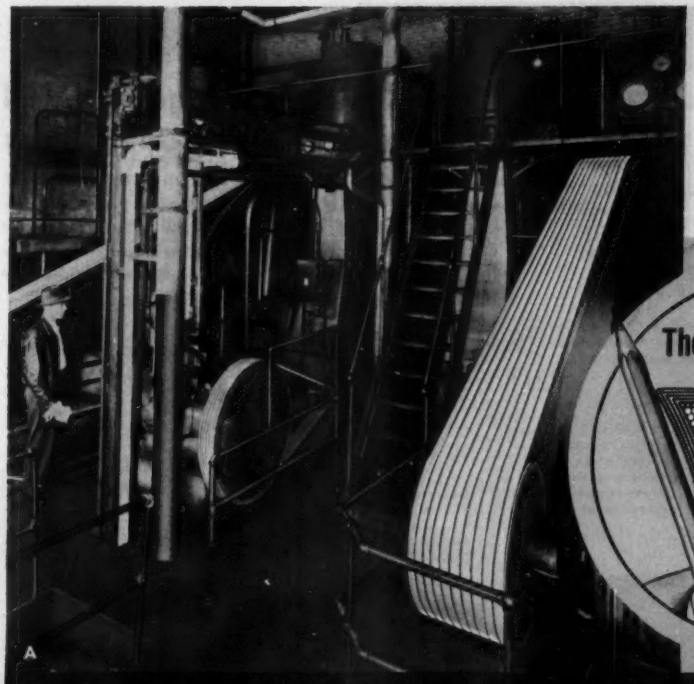


Industrial Fans

Utility Sets

YOUR BEST BUY AMERICAN BLOWER AIR HANDLING EQUIPMENT

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON



These big compressors of the Montana Service Corp., Butte, Montana, are driven by Gates Vulco Ropes from grooved sheaves on the motors to **flat faced flywheels.** Mr. Oscar Olson, Plant Engineer, reports excellent service from these Gates Vulco Rope V-flat drives.

This test shows how the Concave Side gives you a real saving in V-Belt costs

If you are interested in lower operating costs, make this simple test:—

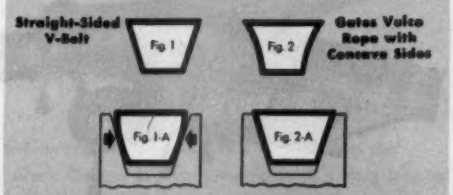
Take *any* V-belt and bend it as it bends in going around a pulley. As the belt bends, grip its sides with your fingers and thumb. You will *feel* the sides of the belt *bulge out!*

This bulging gives a straight-sided V-belt the shape shown in figure 1-A. (See diagrams at right.) Clearly, this shape does not fit the sheave groove. The sides of the bulging belt are forced to press unevenly against the V-pulley—and this concentrates the *wear* along the *middle* of the sides.

But when you bend a V-belt that is built with the *Concave Side*, you find that the sides become perfectly straight—as shown in Figure 2-A. This shape precisely fits the sheave groove.

Because there is *no bulging*, the sides of the Gates Vulco Rope always grip the *full* face of the V-pulley

What Happens When a V-Belt Bends



How Straight-Sided V-Belt Bulges in Sheave-Groove. Sides Press Unevenly Against V-Pulley Causing Extra Wear At Point Shown by Arrows.

The Concave Sides Fill Out to a Precise Fit in the Sheave Groove. No Side Bulge! Sides Press Evenly Against the V-Pulley—Uniform Wear—Longer Life!

evenly and therefore wear *uniformly*—resulting in *longer belt life* and *lower belt costs for you.*

Only V-belts made by Gates are built with concave sides. Whenever you buy V-belts, be sure you get the V-belt with the Concave Sides—The Gates Vulco Rope!

CS-514

Gates
Hose V-Belts
Molded Rubber Goods
For Industry

VULCO ROPE **DRIVES**
ENGINEERING OFFICES AND JOBBER STOCKS
IN ALL INDUSTRIAL CENTERS

THE GATES RUBBER COMPANY
DENVER, U. S. A.
The World's Largest Makers of V-Belts

LOOK AT ALL THESE . . .

and all provide absolute control over tonnage handled in feeding and conveying operations

Small Reagent Feeders—with open or enclosed decks for capacities from 10 to 4000 lbs. per hour.

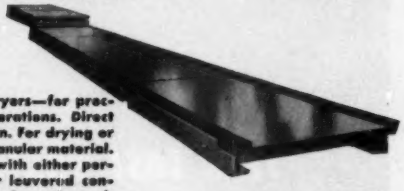
Spreading Feeders—for distributing materials evenly across wide surfaces.

Built in a wide range of types and sizes, Jeffrey electric vibrating Feeders and Conveyors provide absolute control over tonnage handled. Open or enclosed pan, or tubular decks, for capacities ranging from a few pounds to fifteen hundred tons per hour. Investigate the accuracy of this equipment.

Spark-Proof Feeders (left)—for use in explosive atmospheres or where moisture conditions require special protection of coils.

Conveyors—electric vibrating type. 18" diameter tubular conveyor powered by dust-tight power units for use in iron ore sintering plant.

Dust-Tight Feeders (right) — vibrating motor gaps protected from magnetic dust, or explosive dust.

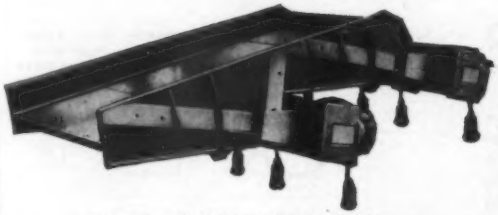


Coolers-Dryers—for processing operations. Direct type shown. For drying or cooling granular material. Equipped with either perforated or louvered conveying surface through which air or gasses are passed.

Water-Jacketed Feeders (left)—for feeding furnaces and driers, or handling hot material to coolers, etc.

Bin Level Indicator (above)—shows bin level at a glance to control feed to bin, maintain bin level or control discharging equipment.

Low Head type Barrel Packer (above)—a real economy in reducing size of containers, increasing capacity and cutting shipping costs. Can be supplied with deck to provide conveying action during packing operations.



Large Capacity HEAVY DUTY Pan Feeders

Also electric vibrating Screens, Bin Check Valves, Electronic Controls, Magnetic Separators and Mechanical Vibrating Conveyors. Let us tell you more about these units and what they can do for you. Write us today.

THE JEFFREY MANUFACTURING COMPANY Established 1877

905 North Fourth St., Columbus 16, Ohio

Complete Line of Material Handling, Processing and Mining Equipment

Baltimore 2 · Beckley, W. Va. · Birmingham 3 · Boston 16 · Buffalo 2 · Chicago 1 · Cincinnati 2 · Cleveland 15 · Denver 2 · Detroit 13 · Harlan, Ky. · Houston 2 · Jacksonville 2 · Milwaukee 2 · New York 7 · Philadelphia 3 · Pittsburgh 22 · St. Louis 1 · Salt Lake City 1 · Scranton 3

Jeffrey Mfg. Co. Ltd., Montreal, Canada
Jeffrey-Galion (Pty.) Ltd., Johannesburg, S.A.
The Ohio Malleable Iron Co., Columbus, Ohio
British Jeffrey-Diamond Ltd., Wakefield, England
The Galion Iron Works & Mfg. Co., Galion, Ohio
The Kilbourne & Jacobs Mfg. Co., Columbus, Ohio

Remember—

the trade marks "tt" and "TUBE-TURN" are applicable only to products of TUBE TURNS, INC.

Bring on your severe conditions—

YOUR FIRST CHOICE for *severe service* conditions in piping is the TUBE-TURN Welding Neck Flange. It is engineered with a long tapered hub and a smooth transition in thickness to the pipe-end bevel. This means greater pressure-containing capacity under extreme temperature as well as much longer life than other types when repeated pipe bending or severe vibrations are involved.

For other jobs choose from these TUBE-TURN Welding Flanges: slip-on flanges; lap-joint flanges; socket-welding flanges; blind flanges; orifice flanges; pipeline non-standard flanges. Get in touch with your nearby TUBE TURNS' Distributor. You'll find one in every principal city.

Write Dept. D-4 for free booklet, "Research on the Cyclic Life of Piping Systems."

"Be sure you see the double tt*"*

TUBE TURNS, INC. LOUISVILLE 1, KENTUCKY

DISTRICT OFFICES: New York • Philadelphia • Pittsburgh • Chicago • Houston • Tulsa • San Francisco • Los Angeles
TUBE TURNS OF CANADA LIMITED, CHATHAM, ONTARIO ... A wholly owned subsidiary of TUBE TURNS, INC.

Welded wrought-iron lines serve new Hospital Buildings

Underground tunnels at Cleveland's City Hospital contain the old and the new in piping. New 125-pound steam main (Fig. 1) serving several new buildings is welded. A welded system with TUBE-TURN Fittings was chosen to cut installation time, and to get tight, leakproof joints.

New welded line (Fig. 2) elbows neatly over an older pipe. When space is confined like this, welding is the answer. Contractor welded pipe from 2" up to 12" in tunnels, boiler room and power house.

With welding equipment on the job it's easier to put up pipe supports too. Eyebolt (Fig. 3) is quickly welded to TUBE-TURN Elbow, support rod hooked through it. This steam line to the water heaters must be secure.

Insulation on the maze of piping to the boiler feed pumps (Fig. 4) went up fast, with no flanges to work around. In such close quarters a neat design and reduced space requirements are especially important. And with the pipe welded to TUBE-TURN Fittings, joints won't leak, and insulation will last.

DISTRICT OFFICES
New York
Philadelphia
Pittsburgh
Chicago
Houston
Tulsa
San Francisco
Los Angeles

TUBE TURNS, INC.
LOUISVILLE, KENTUCKY

Fig. 1. Welded underground steam main.

Fig. 2. New welded piping fits in small space.

Fig. 3. Support on steam line elbow.

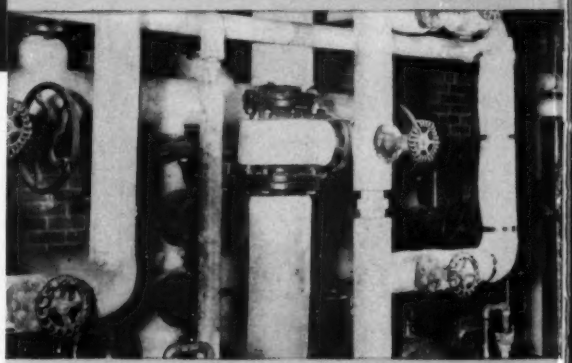
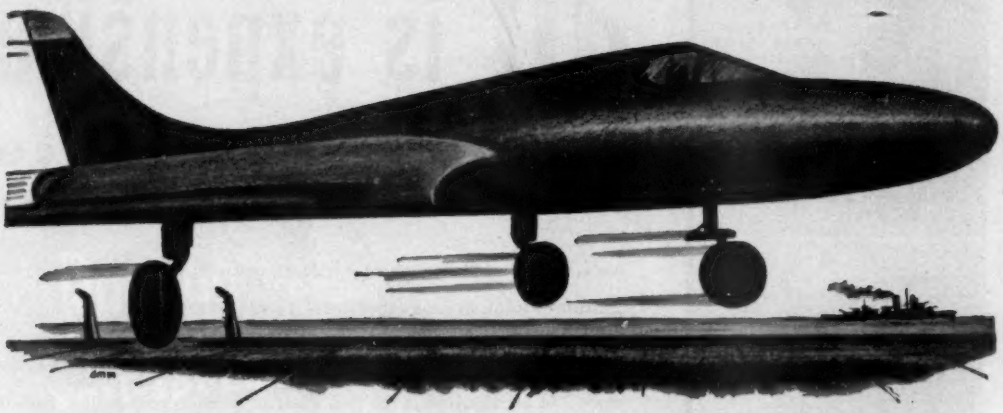


Fig. 4. Insulated welded piping.

TUBE TURNS, INC., Dept. D-4
224 East Broadway • Louisville 1, Kentucky

Your Name .....
Position .....
Company .....
Nature of Business .....
Address .....
City ..... *State* .....

When Uncle Sam says, "GO!"



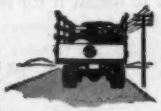
. . . let Barrett SPEED your Roofing Jobs!

America's great armament program is going to call for a lot of speed in a lot of places. New plants will have to be put up—and old ones reconditioned—"almost over night."

This, in turn, is going to call for a great many new roofs. If you find yourself in need of a new roof in a *hurry*, you can't do better than to turn to Barrett. Barrett can give you the world's longest-lasting built-up roof in the shortest possible time. For Barrett *speeds* your roofing jobs in 4 important ways:

1 **Barrett speeds specifications.** Ready at hand are Barrett time-tested, scientifically calculated application specifications for almost every built-up roofing problem. These are so foolproof that Barrett* Specification* Roofs can be bonded for 20 years, and generally last much longer. Approved by the National Board of Fire Underwriters—Class A.

2 **Barrett speeds deliveries.** Strategically located supply points enable us to rush materials to your Barrett roofing contractor, and to your job when they are needed.



3 **Barrett speeds application.** Barrett does not have to rely on outside sources of supply for roofing pitch and felt. Because Barrett Specification* pitch and felt are made in our own factories, production can be controlled to meet demands. Your Barrett roofer can be sure that he will get the materials he wants when he needs them. No time lost on the job! Moreover, you can be sure that these materials will be of uniform high quality.

4 **Barrett speeds you the finest possible roof.** Skilled workmen make for fast jobs. Barrett Approved Roofers have had many years of practical experience, plus well-trained manpower, plus Barrett engineering help, to assure you the finest possible roofing job in the shortest possible time.

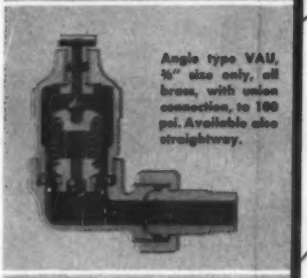
But don't wait until you're up against it before ordering necessary roofing work. Call in a Barrett Approved Roofer today, or write us.

Barrett Specification Roofs*

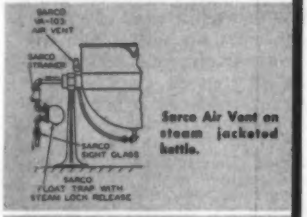
THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.
36th St. & Gray's Ferry Ave., Philadelphia 46, Pa.
205 W. Wacker Drive, Chicago 6, Ill.
1327 Erie Street, Birmingham 8, Alabama
In Canada: The Barrett Company, Ltd., 5551 St. Hubert St., Montreal, P. Q.

*Reg. U. S. Pat. Off.

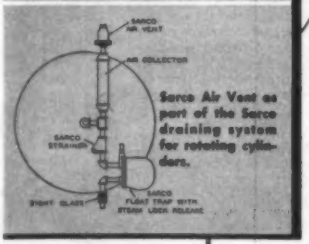
Sarco thermostatic Air Vent type VS, for pressures to 200 psi. Exceptionally large capacity. Sizes ½" to 1½".



Angle type VAU, ½" size only, all brass, with union connection, to 100 psi. Available also straightway.



Sarco Air Vent on steam jacketed kettle.



Sarco Air Vent as part of the Sarco draining system for rotating cylinders.

333

air is expensive in the wrong place

Air is to be found everywhere – indoors, outdoors, above and below. It's difficult to think of it as expensive – it's so plentiful!

But air is to be found also in the steam spaces of your steam heated equipment. The air dissolved in the feed water supplied to your boilers finds its way into the heaters with the steam.

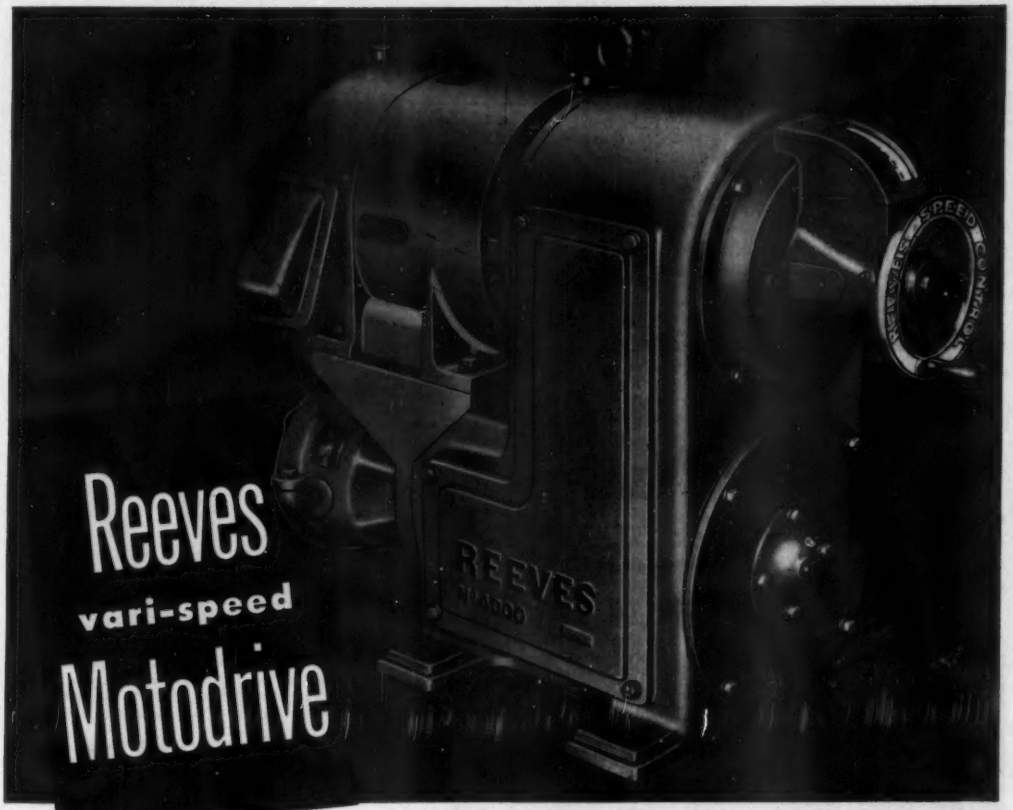
This air *is* expensive – because it reduces the temperature of the steam, and coats the heating surfaces with a film which retards heat transfer, lowers output, and increases losses.

Remove expensive air from your steam heated machines with SARCO THERMOSTATIC AIR VENTS, scientifically designed for this express purpose.

Write for BULLETIN 2751 and the name of the Sarco man nearest you. He will be glad to help you select the best type of vent for your purpose, and the right place to install it for best results.

SARCO ELIMINATES AIR

SARCO COMPANY, INC.
EMPIRE STATE BUILDING, NEW YORK 1, N. Y.
Represented in Principal Cities
SARCO CANADA LTD., TORONTO 5, ONTARIO



your best buy in a complete variable speed power plant

here's why:

1 A *complete,* self-contained variable speed power plant combining motor, REEVES speed varying mechanism and speed reducer in one, space-saving unit.

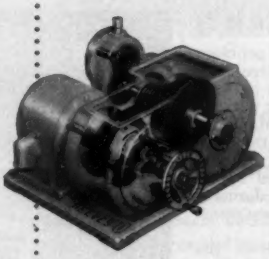
2 Available with any standard, constant-speed, foot-type motor—the same as motors on your other machines—no stocking of special motors.

3 Easily applied to machines in service. Horizontal and vertical models; speed ratios 2:1 through 6:1; sizes 1 to 20 hp; manual or automatic controls. Fractional hp units also available in ratios up to 10:1.

4 REEVES operating principle—proved in 300,000 installations—assures *positive, accurate* speed changes without stopping machine.

For *your* machines, new or old, specify REEVES Speed Control and secure all the benefits of stepless speed adjustability. For full information, send for catalog No. PE64-G.

Here Is How It Works



Phantom view of horizontal model with single reducer.

The Motodrive utilizes proved REEVES operating principle of a V-belt driving between two pairs of cone-shaped discs which are adjustable to form an infinite number of driving and driven diameters. Discs are mounted on parallel shafts. One shaft receives power at constant speed from motor—other delivers power at infinitely adjustable speeds to gear reducer from which desired speed is transmitted to driven machine.

REEVES PULLEY COMPANY • COLUMBUS, INDIANA

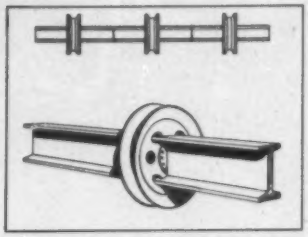
Recognized leader in the specialized field of speed control engineering

accurate · variable
REEVES *Speed Control*

PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Welding One from Three

WELDING THREE sections of I beam into one long beam is an easy job for Carl S. Kelly. He suggests using auto wheels which are cut out so they can be slipped onto I beams.



Here is clever idea for welding three sections of I beam into one long beam

After the wheel has been slipped on, the beam is easy to turn over to bevel and line up. The finished beam, one long section now, is simple to roll and keep straight. *From The Stabilizer, a publication of The Lincoln Electric Co., Cleveland 1, Ohio.*

General Maintenance of Hydraulic Systems

THE GREATEST aid in keeping hydraulic systems in good working condition is to maintain the correct fluid level with the recommended type and viscosity oil. With the system filled properly, air is less likely to be drawn into the system and there will be little tendency for the oil to foam. If foaming does occur, the system should be cleaned and refilled with the proper oil.

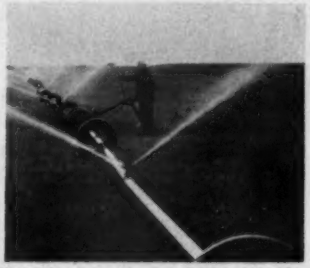
Dirty oil is the greatest enemy to hydraulic systems. Not only does it cause rapid wear to the mechanical working parts of the system but also, shortens the useful life of seals and packings. Every effort should be made to assure keeping any dirt or foreign matter out of the hydraulic oil. Always use clean containers when storing the oil and, if possible, filter or strain the oil before filling the system.

The following suggestions will help obtain the best performance from hydraulic systems: 1. Use the proper type and viscosity oil in the hydraulic system. 2. Check the hydraulic oil level periodically and keep the system filled to the proper level at all times. 3. Drain and refill with the correct viscosity at regular intervals as recommended for the particular unit. 4. Maintain all connections and the entire system in good condition, free from leaks. 5. The oil used in hydraulic systems should be clean and kept clean. Dirt in the oil causes rapid and unnecessary wear of pump, valve and other closely fitted parts. 6. On open systems, be sure the air breathers are kept open. Breathers should be serviced whenever the air cleaners are serviced. *From The Reporter, a publication of Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee, Wisc.*

Sprinklers on Wheels Wet the Lawn in A Hurry

HERE'S A CLEVER idea to take care of that very large lawn about the plant. This idea will eliminate the usual cycle of stoop, lift, carry, drop and reconnect sections of a thousand-foot sprinkler lateral.

A sprinkler system on wheels was



Sprinkler system on wheels gets the whole lawn wet without the usual stoop, lift, carry of sprinkler laterals

devised by Howard Hale to take care of the many sprinkling jobs on his farm. He accomplished this feat by the use of wheels and tires from an auto graveyard, plus some heavy strap iron, a few large diameter pipe

The Only Parking Space Left Is Up

DO YOU HAVE a parking lot problem like this? Consolidated Vultee Aircraft Corp. has expanded its parking facilities to the limit. Their parking lots cover some 350,000 sq yd, with a capacity of 9,000 cars, and they are still trying to find ways to squeeze more cars into the allotted space. (See Mr. Clayton's letter, January 1951 issue of PLANT ENGINEERING, page 4.)

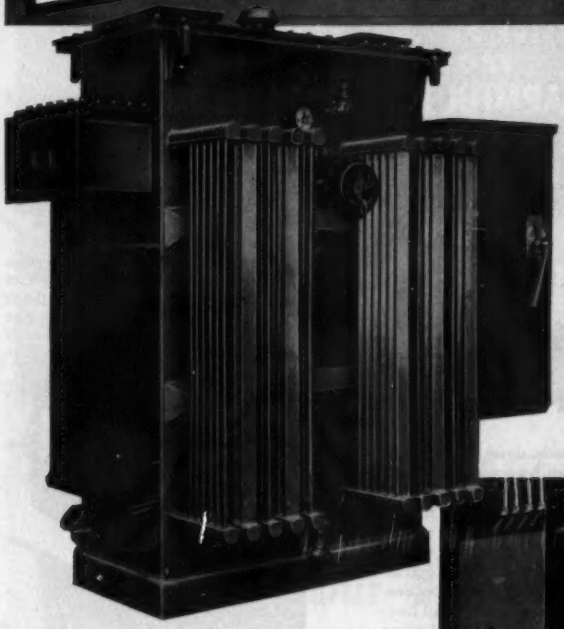
This picture plainly shows the problem the company faces. Arrows point to aisles, which should be kept free, but which, instead, are being used as parking space. The picture appeared in the company house organ and asked employees to show some consideration for the other fellow by not parking cars in aisles. Only a helicopter could get out of this lot in an emergency. The alternatives suggested: Double up on rides and give the other fellow a break when parking. *From Convairiety, a publication of Consolidated Aircraft Corp., San Diego, Calif.*

Convair is getting parking lot headaches trying to find a solution to this knotty problem. Maybe you have a suggestion which will help solve their parking problem

Wagner®
TRANSFORMERS
... the choice of leaders in industry

UNIT SUBSTATION TRANSFORMERS

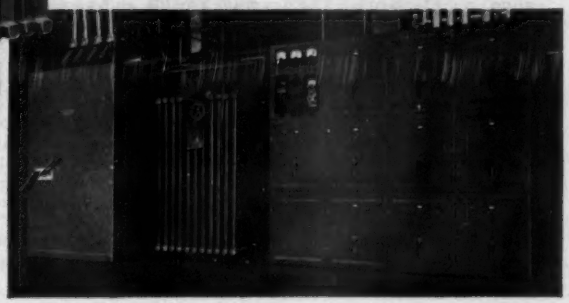
DESIGNED FOR PLANT POWER DISTRIBUTION SYSTEMS

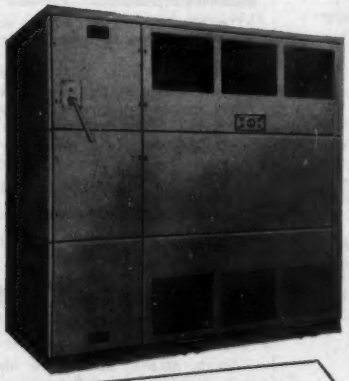


Wagner-equipped unit substation in a synthetic textile plant.

The ever-increasing demand for electric energy to power today's stepped-up production presents a critical problem. The answer to this problem has been found in load-center power distribution systems. The vital part of the load-center system is the transformer. If a switch or circuit breaker fails, only a part of the system is affected—but if the transformer fails, the entire system is dead.

Wagner Unit Substation Transformers assure a continuous, dependable flow of power. They are carefully designed to meet your distribution requirements, and are available with various types of entrances and controls for the high-voltage circuits, and with proper throats on the secondary side to connect to any make of switchgear, in the usual range of ratings up to 2000 kva.





Dry-Type Indoor Transformers

Wagner now furnishes three-phase dry-type transformers in ratings up to 2000 kva in the 15 kv class and below. These units are compactly housed in neat, attractive enclosures, which can be arranged to include primary and secondary switchgear compartments to form readily accessible, closely-coupled unit substations. Relatively light in weight, so that they can be used in multi-story buildings, they are readily adaptable to any installation requirement.

Wagner Electric Corporation
1891 1951

WAGNER ELECTRIC CORPORATION
6492 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 31 PRINCIPAL CITIES

New R & M *ALL-WEATHER* Motors Resist Condensation or a Cloudburst!

Moisture is *Motor Enemy No. 1.* It attacks metal parts, deteriorates insulation, reduces bearing life . . . causes trouble and *premature* failure. Even in "dry" environments, *condensation* within a motor cannot be prevented. So Robbins & Myers has done something about it with *brand-new* R & M "Weatherizing."

Each motor part is now protected from damaging fumes as well as moisture—*at no extra cost to the buyer.* It's one of the many "extras" you get in standard R & M Motors. You also get R & M "Clean Sweep" high-velocity, end-to-end ventilation . . . *pre-lubricated,* sealed ball bearings (adopted in 1939) . . . insulation of phase groups *and* coil windings . . . *full-height* end protection . . . and *many other* construction refinements which make these cool-running, long-lasting, low-maintenance motors *ideal* for every service.

You can install R & M All-Weather Motors outdoors, without a cover —in dusty or damp locations—*anywhere!* They're the finest motors we have made in over fifty years of quality motor production.

You Get All This EXTRA Money-Saving Protection

ROTOR. Finished rotor is sprayed with a special rust-inhibitor which covers the armature, shaft, and cadmium-plated fan used on smaller motor sizes. Larger motors have aluminum fans.

CAST-IRON PARTS. End-heads and terminal box are carefully cleaned and then given the same anti-corrosion treatment frequently specified by our Armed Forces for use in damp climates. Painting follows.

STEEL PARTS. Complete assembly of body and shell, with the stator, is dipped in "Robbinite," and this moisture-resisting undercoating—developed by Robbins & Myers—is then baked on.

SEALED AGAINST LEAKAGE. Terminal box is gasketed. Lead-ins are sealed at motor shell. Repellent grease on shaft keeps moisture away from bearings. End-heads give full-height motor protection.

• Drip-proof, splash-proof, explosion-proof, and totally enclosed fan-cooled. Normal or high torque or slip. Single-phase and D.C. from 1 to 7½ h.p. Polyphase from 1 to 50 h.p. For literature or gratis aid in solving powering problems, address Dept. J 41

ROBBINS & MYERS • INC.

SPRINGFIELD 99, OHIO • BRANTFORD, ONTARIO

MOTORS • HOISTS • CRANES • FANS • MOYNO PUMPS

sleeves, and chain and sprockets from an old combine. All these parts were rearranged by welding and gave him something new in the way of a sprinkling device. This sprinkler system enables him to move 1,000 feet of pipe at a time. *From an article by D. L. Brechner, in The Reclamation Era, a publication of The Bureau of Reclamation, U. S. Dept. of Interior, Washington 25, D. C.*

Cutting Safety Glass

SAFETY GLASS, or shatter-proof glass, is constructed in such a way that normal glass-cutting methods must be supplemented by a melting process. This is necessary because of the thin layer of special high-strength plastic which is sandwiched between the two layers of polished plate glass.

Cutting a section of safety glass could be a ticklish job, but it can be accomplished quite easily if these steps are followed. First, place the safety glass over the pattern and trace the outline on the glass. The

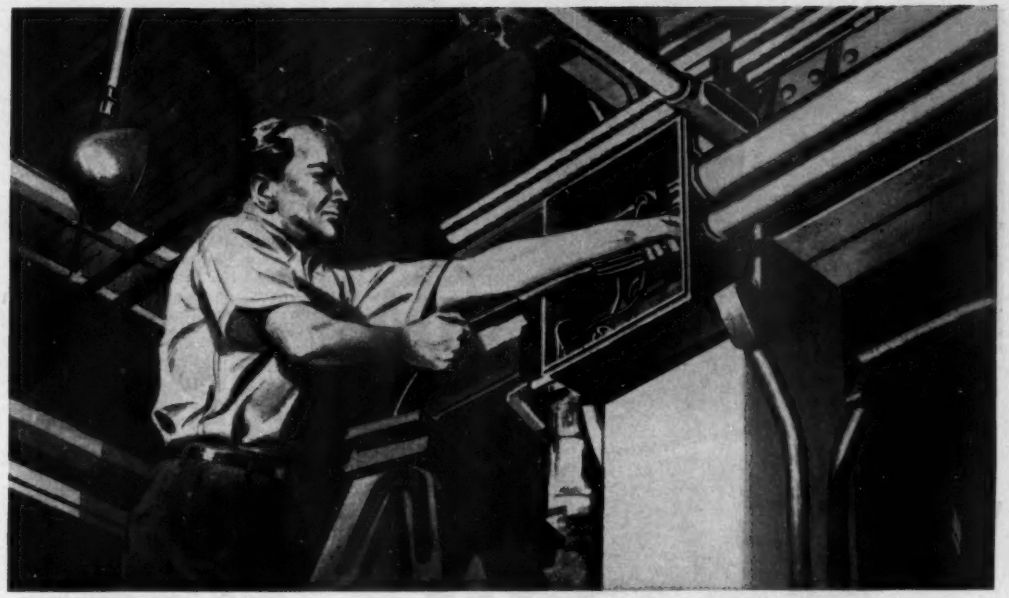
After the two layers of glass are cut, flame is applied to melt plastic layer

two layers of plate glass should then be cut with a standard glass cutter. After the layers have been cut, use a pair of pliers to break the glass layers by applying pressure along the cut seam. The plastic layer is then melted by applying an open flame directly along the cut edge. *From Linde Tips, a publication of The Linde Air Products Co., New York 17, N. Y.*

Pipe Conveyors Aren't Afraid Of Abrasive Materials

SAND, SILICA, and other abrasive ingredients of glass furnace charges are destructive to most conveyor materials when moving at slow speeds. But the service becomes many times rougher when moving at speeds up to an estimated 100 mi an hour.

Yet these conditions were faced by the McKee Glass Co., Jeannette, Pa., when it adopted a pneumatic



How to pack 64% more current into your existing raceways

Have you considered meeting today's extra load demands *without* adding new raceways? By installing General Electric Deltabeston* AVA cable in your present raceways, you actually may get as much as 64% more current-carrying capacity than ordinary 60 C cable can provide.

HERE'S WHY: G-E Deltabeston AVA cable is doubly insulated with heat-beating asbestos, plus No. 1799 varnished cambric. This combination permits the cable to operate effectively at higher copper temperatures. Thus, at normal ambient temperatures, AVA cable can safely carry *more current* than ordinary types. The inherent non-aging characteristics of asbestos give the extra advantages of long life and efficient operation.

When you modernize your electric system, look to Deltabeston AVA for savings in materials, dollars, time . . . with no raceways to replace, Deltabeston AVA cable is easy to install. And when planning *new* construction, specify Deltabeston AVA cable, so that you will be prepared for future load increases.

For more information, call on your local G-E distributor. Section W58-483, Construction Materials Department, General Electric Company, Bridgeport 2, Conn.

*Registered Trade Mark of General Electric Company

DELTABESTON
Wires and Cables
Built to beat the heat

You can put your confidence in—

GENERAL ELECTRIC

MAGNESIUM CHIPS

SAND FROM WHEEL PITS

SPENCER VACUUM IN THE *Metal* INDUSTRIES for

A recovery of tons of babbitt, or pounds of solder flux and gold, or the cleaning of hot pits without waiting for them to cool are essential applications of Spencer Vacuum introduced in the speed-up during the last war. Delicate instruments were bench assembled, inspected and cleaned in half the time, and thousands of products made ready for painting or enameling in minutes instead of hours.

Withall, the same machine improved the sanitary conditions of busy plants and removed bulky materials from floors and dangerous dusts from pipes, ceilings and walls.

There are more than 100 essential industrial economies illustrated in Spencer Bulletin No. 144—yours for the asking.

BENCH CLEANING
METAL RECLAIMING
MILLING CHIPS
SOAKING PITS
SUMP CLEANING
TANK CLEANING
TIN PLATE CLEANING
WELDING FUMES AND FLUX AND
ALL AROUND SANITATION

SPENCER 1½ H.P. INDUSTRIAL PORTABLE

427-8

THE SPENCER TURBINE COMPANY • HARTFORD 6, CONNECTICUT

SPENCER
HARTFORD

conveyor system for handling furnace charges. Raw materials used include silica, sand, feldspar, fluorspar and borax, which are transferred from boxcars to storage bins by means of three overhead vacuum pipe lines, each 115 ft long with an inside diameter of 5 and 6 in. and a wall thickness of 5/16 of an inch. It is in these pipes that the raw materials reach an estimated speed of 100 mph.

Originally the lines used standard steel pipe and fittings, which wore out in a short time. In addition to high cost of frequent replacement, iron contamination caused a yellowish-brown discoloration of the glass.

After various tests, it was decided to try out Ni-Hard, a nickel-chromium white iron, for the elbows, which are subjected to the worst wear. The new elbows were found to have about four times the wear resistance of carbon steel. Now the entire conveyor system is equipped with this material.

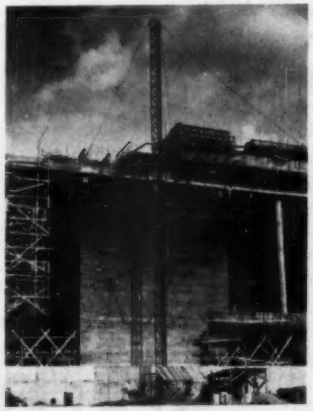
Iron contamination has been reduced by the introduction of pulleys using permanent magnets made of Alnico, manufactured by Eriez Mfg. Co., Erie, Pa. These pulleys remove tramp iron particles. *From Inco, a publication of The International Nickel Co., Inc., New York 5, New York.*

Build Your Elevators On the Ground

THE MATERIAL elevator used in the construction of the new Rice Institute stadium was erected in a rather unique manner.

The elevator was assembled on the ground with its foot at a predesignated spot. It lay parallel to the building when a large crawler crane hooked onto it with a sling in two places and lifted it to a vertical position.

Then, the entire assembly was



Material elevator was constructed on ground and then erected in position

ANNOUNCING...

THE NEW

OTC POWER-TWIN

HYDRAULIC PULLER

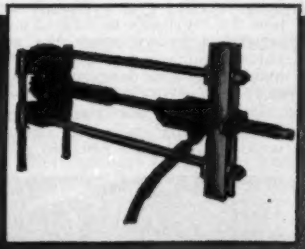
WITH THE CENTER HOLE

***Greatest advancement in* Push-Pulling *since* OTC Grip-o-matic**

- **Fits all OTC pulling units**
- **Works in any position**
- **Pushes—Pulls**
- **Faster than screw operation**
- **Eliminates torque**
- **More powerful—friction eliminated**
- **Easier—just light pump strokes**
- **Safer—remote control**

The fastest, easiest working, handiest PUSH-PULLER in history . . . sensational in performance, its time and labor saving ability and low cost make it a must for any shop. See your jobber for complete information or write us.

CENTER HOLE permits Power-Twin to do jobs no other hydraulic ram can do . . . makes possible application of direct force . . . fast, easy, unlimited adjustment . . . versatile interchange of parts.



Spline shaft bearing comes off quickly with OTC Power-Twin, Push-Puller and 952 attachment.

OTC Power-Twin with 1003-L Grip-O-Matic and 952 attachment pulls pilot carrier bearing easily.

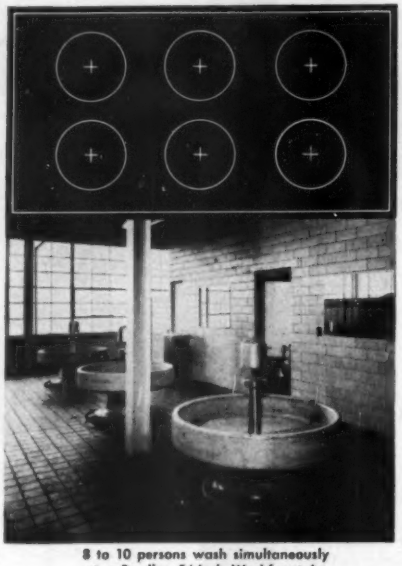
New OTC Hydra-Tote takes all tools to the job. Portable hydraulic pulling unit includes OPEN THROAT pressplate.

Unseli Press Plate available separately for mounting on bench or service truck.

OTC OWATONNA TOOL COMPANY

446 CEDAR STREET • OWATONNA, MINNESOTA

BRADLEY
Washroom Engineers
Ready to Help Plan Sanitary *and* Economical Washing Facilities



8 to 10 persons wash simultaneously at a Bradley 54-inch Washfountain.

As important as any Safety measure in your plant are employee washing facilities ... Bradley men can help you in washroom layouts to provide maximum facilities in minimum space.

They can show you how plants large and small throughout the nation have standardized on Bradley Group Washfountains, and explain how piping connections are reduced over 70 per cent along with water consumption and maintenance.

If, before calling in a Bradley man, you want further information, write for a copy of our 4-color Catalog 4701. There is no obligation. BRADLEY WASHFOUNTAIN CO., 2371 W. Michigan Street, Milwaukee 1, Wisconsin.

Ask for Catalog 4701

BRADLEY Washfountains

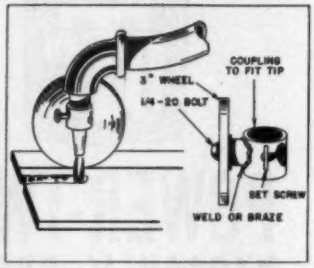
Distributed Through Plumbing Wholesalers

For Quick Action Consult Bradley Men Nearest You . . .

Albany 5, N. Y., Alexander Mitchell
Atlanta 3, Ga., J. B. Barton, Jr.
Baltimore 1, Md., J. J. Taylor
Birmingham 3, Ala., Thomas Supply
Boston 10, Mass., Mills Engineering
Buffalo 2, N. Y., M. S. Jackson
Charleston 28, W. Va., Fireproof Prod.
Charlotte 6, N. C., Wm. H. Shepard & Son
Chicago 10, Ill., Struck Equip. Co.
Chicago 11, Ill., West & Lasley
Cincinnati, Ohio, Loftus-Shoenberger
Cleveland 15, Ohio, Fielding-Wales Co.
Columbus 15, Ohio, A. G. Peterson
Dallas 1, Texas, W. E. Lewis & Co.
Denver 4, Colo., Carl H. Routh Co.
Des Moines 10, Ia., Ostrander-McDonald
Detroit 1, Mich., D. T. Randall & Co.
El Paso, Texas, Harlin Engineering
Evansville 8, Ind., Shouse-Brill Mach.
Fort Wayne 2, Ind., A. Frank Ausman
Houston 6, Texas, Thos. E. Price
Indianapolis 18, Ind., J. Edwin Aspinall
Jacksonville 4, Fla., G. P. Coyle & Son
Kansas City 2, Mo., Rivard Sales Co.
Knoxville 12, Tenn., Chas. F. Sexton
Los Angeles 33, Calif., Frank Peck Spec.
Louisville 5, Ky., J. F. Shouse & Co.
Memphis 3, Tenn., Geo. R. Douglas
Milwaukee 3, Wis., J. R. Petley Co.
Minneapolis 1, Minn., L. M. Bartlett
Missoula, Mont., Horace A. Green
Nashville 4, Tenn., Southern Sales Co.
New Orleans 12, La., W. H. Grant, Jr.
New York 17, N. Y., A. C. Cooper
Oklahoma City 3, Okla., M. F. Fishell
Omaha 2, Nebr., B. G. Peterson
Philadelphia 8, Pa., Alec Hicks
Phoenix, Ariz., Baker-Thomas Co.
Pittsburgh 28, Pa., Paul V. Clarke
Portland 4, Ore., Otto A. Cook
Richmond 22, Va., Joseph F. Leonard
Rochester 20, N. Y., C. A. Kolstad & Son
St. Louis 8, Mo., Heinkel Sales Service
St. Petersburg 1, Fla., Evan S. Hansard
Salt Lake City 12, Utah, Lott & Parry
San Francisco 3, Calif., Trask & Squier Co.
Seattle 4, Wash., Bryan W. Burtch Co.
Spokane, Wash., Heating Assurance, Inc.
Toronto 9, Ont., Aristocrat Mfg. Co., Ltd.
Washington 6, D. C., Paul W. Warren
Worcester 2, Mass., Arthur S. Hall Co.

turned 90 deg and placed on a concrete slab and pinned into the A-frame. More concrete was poured to embed the base, making it absolutely secure. *From the American Crosby Clipper, a publication of American Hoist and Derrick Company, St. Paul 1, Minnesota.*

Guide Wheel for Cutting Torch



This guide wheel for cutting torch not only helps to get a straight cut but also keeps tip at proper distance from plate. (From article by O. Olson, in Linde Tips, a publication of Linde Air Products Co., New York 17, N. Y.)

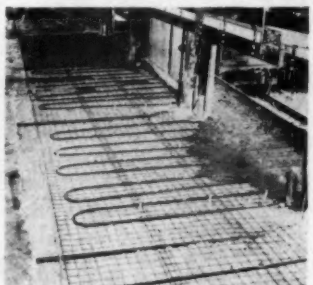
Sugar Gets Radiant Heat Treatment

A SUGAR refinery in the South has solved what was— literally—a sticky problem, through the use of radiant heat.

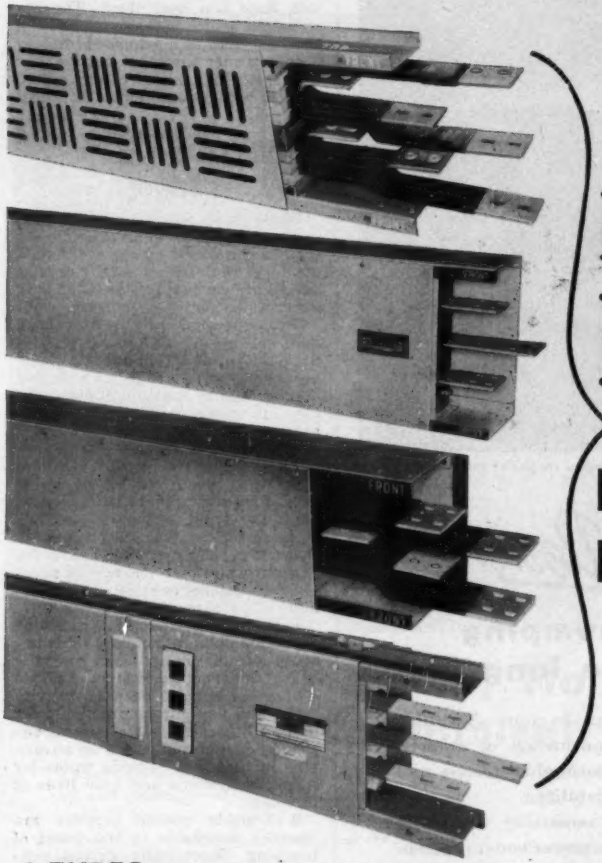
Officials of the refinery had been plagued for a long time by the presence of moisture on the floors of their raw sugar warehouses. These warehouses are located at a deep water port where relative humidities range quite high.

The floors consisted of concrete covered with quarter-inch steel plates. Cold-weather sweating, particularly after a warm humid night, plus the inevitable spilling of sugar, created a hazard when the small particles adhered to the floor surface making the area dangerous to work in.

The old floor was ripped up, radiant heating coils of one-inch wrought iron pipe installed and a



Radiant heating system under warehouse floor has eliminated condensation



BUS DUCT IS FLEXIBLE

FOR EXPANDING POWER DEMANDS...

4 TYPES OF WESTINGHOUSE BUS DUCT HANDLE ALL LOAD REQUIREMENTS, MEET ALL SERVICE CONDITIONS

Up to 5,000 amperes, Westinghouse Bus Duct provides more power per pound of equipment than any system of wireway, cable or conduit.

Westinghouse Duct is quicker and easier to install, too, whether the job is a new layout or a change-over. Prefabricated sections, in any required length, are convenient to handle and mount. No problem, either, with sharp turns or limited space—in any plane—with standardized tees, ells and crossovers.

Westinghouse Duct meets any load requirement or service condition from power source to machine:

1. LOW-IMPEDANCE DUCT . . . Long feeder runs from switchgear to remote areas. (For minimum voltage drop.)
2. WEATHERPROOF DUCT . . . Outside runs from transformer to switchgear.
3. WEATHERPROOF LOW-IMPEDANCE DUCT . . . For high current-carrying capacity from transformer to switchgear.
4. PLUG-IN DUCT . . . For branch runs; brings power directly to consuming equipment; plug-ins every foot make machine hookups a simple task.

Call your Westinghouse distributor for complete data, or write for Bus Duct Manual B-4272-A, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-30056

DESIGN TESTED AND VERIFIED IN THE Westinghouse HIGH POWER LABORATORY

YOU CAN BE SURE IF IT'S Westinghouse

BUS DUCT

Fig. 3169 single stage, open impeller centrifugal

Goulds *New Design*

gives carefree pumping efficiency for the long pull

The 3169 is one of the latest designs to come off Goulds drawing board. It takes every advantage of modern hydraulic design—and it is thoroughly tested and proven for economy and dependability.

With the 3169 you get tremendous versatility with high operating efficiency and relatively low power consumption.

REAL "JACK-OF-ALL-TRADES" ADAPTABILITY

This new pump will fit many applications—water service, irrigation, slurries, circulation, transfer, factory wastes, air conditioning service, plumbing, heating, and many others. If you face conversion, this adaptability is a double value.

TEN SIZES TO FIT YOUR NEEDS

Available in ten sizes for both motor and belt drives. Capacities up to 1080 G.P.M.—with heads to 290 ft. depending upon capacity.

For complete information phone or write Pump Headquarters, Seneca Falls, N. Y. Ask for Bulletin 720.4.

MEMBER

Goulds PUMPS INC. Seneca Falls New York

new floor laid over them. The installation, which is regulated to keep the floor slab at a temperature 5 to 8 deg warmer than that outside, has completely eliminated condensation. *From a news release for A. M. Byers Co.*

Industrial Fire Defense From Atomic Bombing

WHEN AN ATOMIC bomb is exploded in the air, radiation is a comparatively small factor except at the moment of detonation and directly under the air blast. The immediate general problem is one of fire.

Plants located within roughly a mile and a half of "ground zero"—the point on the ground directly under the blast—suffer such heavy damage and so many casualties that they are unable to do much towards helping themselves.

Beyond, in the area of up to four miles from "ground zero," where damage is small but where many small fires start, plants must be prepared to rely on their own resources, at least for a time, in putting out these fires. They should check the existence and maintenance of present defenses and consider the following:

1. Public water supplies cannot be depended upon in bombing raids because of the many leaks and the heavy drain on the system. Private sources of supply, such as gravity tanks and fire pumps drawing from nearby bodies of water and above-ground suction tanks, are an advantage in that they provide water for sprinkler systems and hose lines at the plant.

2. Outside power supplies are likewise unreliable in the event of bombing. Electrically driven centrifugal fire pumps supplied solely with outside power are likely to be disrupted, and should also be supplied by plant power if available. Gasoline and diesel driven centrifugal fire pumps and steam fire pumps, which operate without outside power, will continue to be available unless the plant itself is damaged.

3. A plant fire brigade should be established. When communications are disrupted and many small fires are burning, it is very important to have trained reliable men in all plant locations to take charge of fire fighting in their area. Equipment designed to fight the type of fire found in the various areas should be widely distributed. All employees should have some knowledge of handling such equipment so that if members of the fire brigade are injured or away from their particular area in the emergency, somebody will attack the fire.

4. A plan of action should be considered for shutting down hazardous processes, and taking what protective steps are possible to cut down on the amount of exposed flam-

Ceiling, Silencer, Floor or Roof — One Economical Package

It soaks up sound. It's structural material. It's ceiling and subfloor—or ceiling and roof. It's incombustible. You can smack its perforated bottom . . . or paint it . . . without hurting it, or its acoustical efficiency, a bit.

It's the new Fenestra* Acoustical "AD" Building Panel with a sound reduction coefficient of 0.80! Speedily and easily erected, these long-span panels are going into plants, schools, theaters, churches, hospitals, stores all over the country . . . because they save time, labor, materials and money. They're another standardized Fenestra Product engineered to cut the cost of building.

HERE'S A BRIEF DESCRIPTION OF THE FENESTRA "AD" PANEL PACKAGE:

Size: 6′ to 24′ long, 16″ wide, 3″, 4½″, 6″ and 7½″ deep. 16 to 13-gage USS Steel.

Elements: Cellular panel.

⅛″ holes, 946 per square foot, in bottom surface. Wire-chair insulation support. 1″ thick, 4¼-lb. density glass fibre sound insulation, coated one side. 16-gage cover plates for top.

Fenestra has made similar acoustical-structural products for 20 years and is a member of Acoustical Materials Assn.

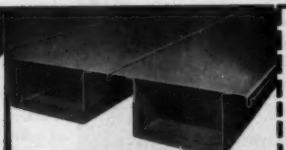
Send coupon for specifications, load tables, installation details, etc. Or call your Fenestra Representative (listed in yellow pages of phone book).

*Trademark

Fenestra **PANELS • DOORS • WINDOWS**

engineered to cut the cost of building

Interlocking "C" Insulated Panels for all walls. Standard width 16″. Depth 3″. Gage steel 18 USS, alum. 16 B&S. Exterior alum. face ribbed or plain.



Interlocking "D" Panels for smooth strong floors and long-span roofs. Standard width 16″. Depths 1½″ to 7½″. Gages 18 to 12.

DETROIT STEEL PRODUCTS COMPANY
Building Panels Division
Dept. PE-4, 2280 E. Grand Boulevard
Detroit 11, Michigan

Please send me, without obligation, information on Fenestra Building Panels.

Name_____

Company_____

Address_____

Designed to handle loads of 500, 1000, or 2000 lbs., the Shepard Niles Lift-About Jr. electric hoist actually exceeds, in performance, that which customarily is expected from these lighter service hoists. And requires less maintenance in doing so.

Two factors are responsible for such outstanding performance: one is a sound engineering background that comes from years of specialized experience. This is apparent in the design and construction of the hoist itself. The other is the Shepard Niles policy of making certain that the hoist you buy is the *right* hoist for *your* service. It is a policy that protects against buying a hoist that is too light for severe service. By the same token, it prevents investing more than necessary when lighter service *is* indicated.

If you would like help with your handling problems, write us. A Shepard Niles specialist will be glad to place our years' of material handling experience at your service.

Shepard Niles

CRANE & HOIST CORPORATION

Makes and sells all three lifting tools for airborne shop loads

474 SCHUYLER AVENUE • MONTOUR FALLS, N. Y.

mables. Following are examples of what such a plan would entail.

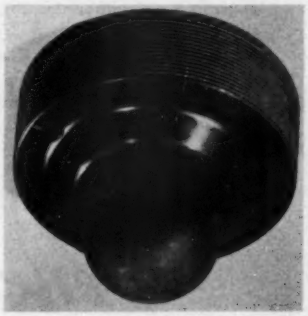
a. Removing flammable liquids from dip, cleaning, and mixing tanks. If this cannot be done, cover tanks tightly. b. Relocation of any storage of flammable liquids at processes or in exposed service tanks to buried tanks or to tightly covered containers. c. Shutting discharge valves on butane or propane storage tanks. d. Shutting off pumps supplying fuel oil under pressure to plant distribution piping. e. Shutting off main valves on flammable gas systems.

All of these steps aim at cutting down fuel for fire and sources of ignition. The final plan of action for any particular plant would, of course, be a good deal more detailed taking into account the actions required in each department. *From Factory Mutual Record, a publication of Factory Mutual Engineering Div., Boston 10, Mass.*

Cementing Oil Wells Calls for Special Material

THE JOB was a special one: cementing oil wells. To shut off water or dangerous excess gas in a well, liquid cement is pumped into certain places in the well. This calls for perfect guiding of casings by what are known as guide shoes and float shoes. The shoe guides the casing safely to the bottom and provides a firm foundation for it until the cement sets permanently around the shoe.

The problem was: to find a material that is durable, drillable and shock resistant. The answer was

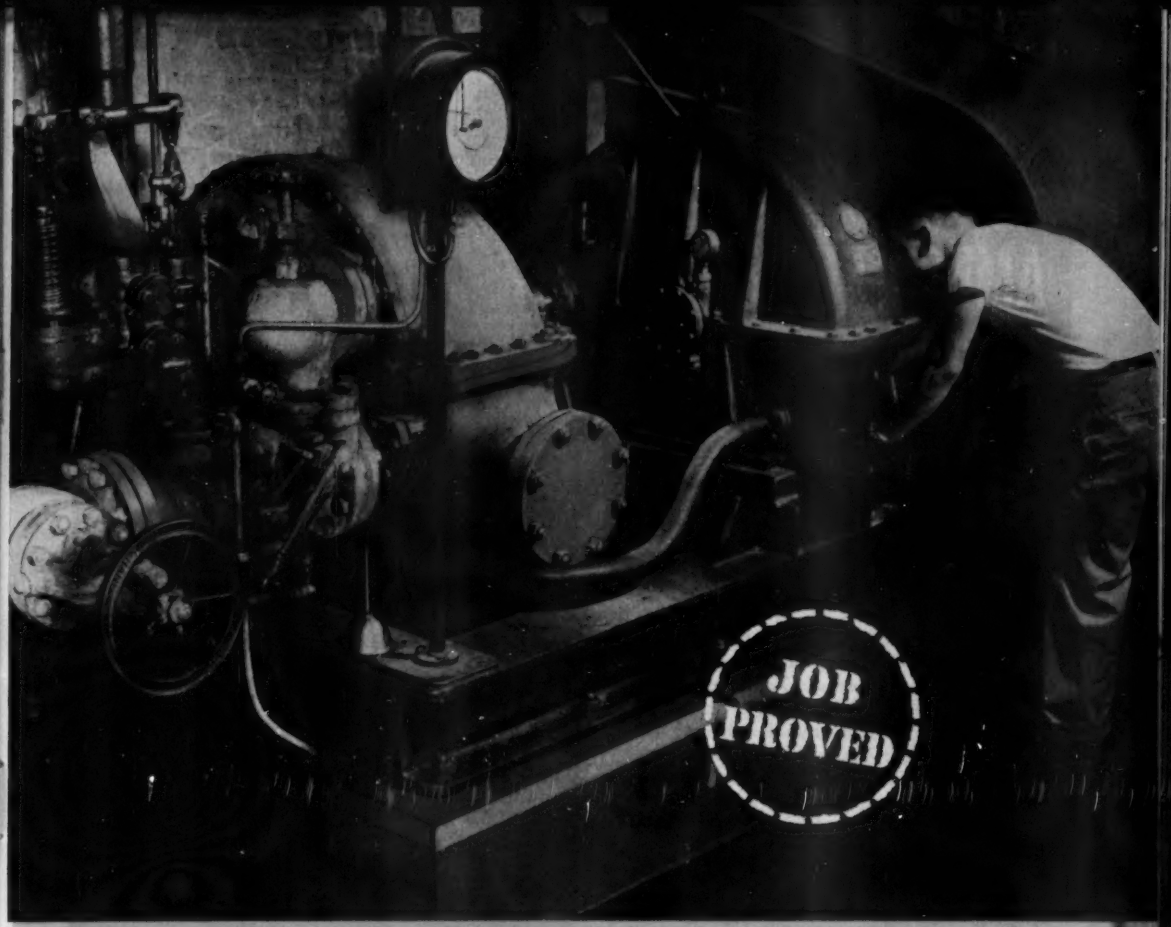


Valve seat and ball used for job of guiding casings for cementing wells

found by using guide shoes and float shoes of industrial Formica. Being especially hard and durable, the units resist the abrasive action of the cement without difficulty.

When the cement has set, the centers of the units are drilled out and chips from the units rise to the surface being forced up with the drilling fluid. That is why the units are red in color. When the chips from them begin to rise to the top, the

(Continued on page 40)



SUNVIS 900 OILS REDUCE COSTS 25%

Papermaker Gets Maximum Equipment Protection, Extra Long Service, from Superior Turbine Lubricants

In a large paper mill, eight steam turbines drive paper machines and pumps, and generate power for ventilating equipment. Ten years ago the mill began lubricating these turbines with a "Job Proved" Sun oil. They gave unfailing service with remarkably low oil and maintenance costs.

Four years ago, when Sunvis "900" Oils first became available, the Sun representative serving the mill saw an opportunity to effect even greater economy. He suggested that the medium-priced Sun oils in use be replaced by the more costly Sunvis "900" Oils. He knew that these modern, fortified lubricants—*more costly* on a per-gallon basis—would prove *less costly* through the years because of their remarkably long life. His suggestion was followed.

The Sunvis "900" Oils have fully justified this confidence, saving the mill 25% or more on lubrication costs. Furthermore, the papermaker knows his equipment—running or idle—is fully protected from rust and corrosion.

Sunvis "900" Oils are *good for the life of your production equipment.* Coupled with the know-how of the Sun representative who calls on you, they are good for your pocketbook, too. For more information, send for a copy of the illustrated booklet "Sunvis '900' Oils." Write Department PY-4.

SUN OIL COMPANY · *Philadelphia 3, Pa.*
In Canada: Sun Oil Company, Ltd.
Toronto and Montreal

SUN PETROLEUM PRODUCTS

"JOB PROVED" IN EVERY INDUSTRY

SUNOCO

This Simple AMERICAN MONORAIL SYSTEM Saves... $12,800 Annually in HANDLING COSTS

● A saving of 64 man-hours per day (2 shifts) resulted when this unique, simple American MonoRail Overhead Handling System was installed. Thirty-two freight car panels are strapped into one bundle—then by aid of a RailMaster Crane and special carrier on crane bridge, two men are able to transfer bundles from shipping room to dock directly into gondola cars.

This entire MonoRail system cost less than $10,000. The yearly savings run well over this figure, therefore the system pays for itself in less than one year.

We'll be glad to apply this "know-how" to your handling problems—just drop us a note. No obligation, of course.

4TH NATIONAL MATERIALS HANDLING EXPOSITION
INTERNATIONAL AMPHITHEATRE CHICAGO
APRIL 30-MAY 4 1951

THE AMERICAN MONORAIL COMPANY

13123 ATHENS AVENUE CLEVELAND 7, OHIO

BULLETINS just released and of immediate plant interest

INSTRUMENTS AND CONTROLS

101 Data on Spring Scales—This informative catalog offers plant engineers more than 40 pp of application and ordering data on spring scales and test apparatus. Covers dynamometer scales, push-pull gages, straight-spring scales, platform scales and conveyor scales, also compression and tension testers, tensiometer, torque tester and consistometer. Illustrated with photos, dimensional sketches, explains operation of the various instruments, discusses special features, gives specifications and suggestions for use. Stresses ability of company's Iso-Elastic springs to stay in calibration. John Chatillon & Sons.

102 Packaged Control—Six-pp Bulletin AV-300 illustrates and describes manufacturer's Electrosire valve, a packaged air control unit consisting of four-way directional valve, solenoid controls, and independent speed regulators for control of piston rod speed of air cylinders in either or both directions. Detailed technical data and wiring diagrams included. The Bellows Co.

103 Control Equipment—Catalog 51, company's newest publication on steam and liquid control equipment, is a more complete, improved book containing 56 pp of illustrations and engineering data. Covers precision pressure regulators, temperature regulators, float valves, water gages, float boxes, safety and relief valves, strainers. Drawings, layout diagrams, dimensions and capacity tables are included. O. C. Keckley Co.

104 Combustion Controls—Catalog CFR, 12 pp, provides latest information, specifications and photos of manufacturer's combustion instruments and controls. In addition to widely used electric damper controls and gages, booklet describes a new master regulator for automatic regulation of steam pressure on any type of stoker-, gas-, or oil-fired boiler and designed for use with an electric drive unit to provide automatic proportioning of fuel and air feed, according to requirements. Cleveland Fuel Equipment Co.

105 Inclined Draft and Vertical Tube Gages—Newly published Bulletin 109 describes portable, stationary and laboratory-type inclined draft gages and accessories. Instructions for securing readings in conjunction with company's pilot tubes are given, as well as suggestions for use of the draft gage. Tables and other useful data are included. Ellison Draft Gage Co., Inc.

106 Proportioning and Weighing—Bulletin 0550 presents an over-all view of company's control panels and automatic scales, illustrating and describing briefly some typical models. Special features of the line are listed, and some typical installations illustrated. Richardson Scale Co.

107 Index to Equipment — Illustrated Bulletin BIF-1 reviews briefly more than 36 bulletins and catalogs currently available on chemical proportioning, volumetric and gravimetric feeders, and recording, indicating and controlling instruments. Includes ordering card for literature listed. BIF Industries.

MATERIALS HANDLING

108 Push, Pull and Lift Equipment—Labor-saving applications of hydraulic pullers and jacks are discussed in Hydraulic Bulletin 51, 8 pp, which also introduces company's Simplex Re-Mo-Trol hydraulic pumps and remote controlled rams. Shows how these units simplify rigging requirements and improve safety in numerous pulling, pushing and lifting operations, by means of "center-hole" tubular ram construction. Complete specifications of Re-Mo-Trol units and other jacks and jennies are included. Templeton, Kenly and Co.

109 Jacks of All Jobs—Sixteen-pp Catalog 1515 illustrates and describes a complete line of ratchet, screw and hydraulic jacks in capacities from 3 to 75 t. Among helpful features are a table of contents by jack models and by industries, a table to help select the correct jack, application pictures, recommended uses for jacks, special features and detailed specifications. The Buda Co.

110 For Easier Lifting—Portable electric hoists in manufacturer's Budgit line are described in Bulletin 391-B, 12 pp. Sizes, lifting capacities (to 4000 lb) and prices are given, and construction features illustrated. Includes more than 40 photos of hoists in use. Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc.

111 For Easier Loading—Full information on adjustable loading docks which speed up freight handling and "mechanize" loading is given in this bulletin. Shows present models of manufacturer's Adjust-A-Docks along with photos of installations. A discussion of their advantages—savings in dock space, handling time, labor and breakage—is included. Design and construction features, operation and uses are also covered. Rowe Methods, Inc.

112 Improved Locomotive Crane—Catalog 52 describes the application of a torque converter combined with fluid clutch to a locomotive crane. Explains how unit automatically provides correct torque in exact amount needed to move the load, enabling operator to move load up and down fractions of an inch at a time, eliminates shock loading on gears, "slip-clutching" at full throttle to start heavy loads. Orton Crane & Shovel Co.

113 Material Flow Equipment—Catalog GC-51 is a new 24-pp ordering guide on gravity and powered conveyors, hand and platform trucks. Describes types and features and gives specifications and application data on the full line. Booklet is compiled for easy reference, illustrated throughout. The Rapids-Standard Co., Inc.

114 Lifters at Work—Bulletin 48-A is a pictorial presentation of hand and electric powered hoisting units up to 5000 lb capacity, showing some of the many jobs they do, from stacking of sacks to double decking of refrigerators. Economy Engineering Co.

115 Speed Trucks—This illustrated bulletin describes a gasoline-powered truck with speeds to 15 mph for handling all kinds of materials. Photos show construction details of this heavy-duty truck and how it handles different types of loads. Specifications given, optional equipment listed. Kalamazoo Mfg. Co.

116 Switcher Locomotive—Bulletin GEA-4657A, 16 pp, describing in detail company's 70-t 600 hp diesel locomotive, shows why it is well-liked by the men who operate it. Discusses and illustrates its power plant, electric drive, equalised swivel trucks, and controls. Includes performance data, car haulage capacity at different speeds and grades. General Electric Co.

ELECTRICITY

117 Mill Motors and Controls—Twenty-pp Booklet B-4730 describes manufacturer's 600 Series mill motors and Class 9500 d-c magnetic mill auxiliary controls. Discusses design features of motors, their armatures, bearings, field coils, ventilation. Stresses high starting torque, simplified construction, utilization of space within frame. Controllers described use company's new Type M contactor available in NEMA ratings from 25 to 2500 amp. Different controllers are listed with a typical circuit diagram explained. Operation of plugging relays is also explained, standard accessories described. Westinghouse Electric Corp.

118 Improved Motor—This 2-pp illustrated bulletin presents a redesigned electric motor. Stresses aluminum frame, completely smooth exterior possible because through bolts have been eliminated, other features. Lists styles available, includes dimensions. Scot, Inc.

119 Check List for Lighting Equipment—Four-pp Bulletin 1050 tells how to specify RLM labeled lighting equipment. Features an easy-to-use chart which shows whether or not a certain type of unit is RLM certified, names of manufacturers of RLM units of type and size desired, and lighting units not yet certified, but in process of being tested. RLM Standards Institute.

CONSTRUCTION

120 For Faster Fastening—Form 35-A explains and illustrates company's system of fastening tools and fasteners for use with steel, wood, concrete and fabricated hard materials. Lists equipment for light and heavy-duty use, also fastening charges.

April, 1951

Card void after 6 months.

PLANT ENGINEERING

Please have manufacturers send without obligation information or bulletins indicated by following numbers.

.....

.....

.....

.....

.....

Please Print or Typewrite

Your Name .....

Your Title .....

Your Company Name .....

Company Address .....

City..... State.....

(If you prefer delivery at your home also fill below)

Home Address .....

City..... State.....

.....

.....

.....

Also, use this card for more information on advertised products.

Pictures some typical applications. Ramset Fastening System, Inc.

121 Walls Where You Want Them—How to solve constantly changing space requirements with flexible interiors, and how to make interiors more useful and attractive at less cost are among subjects covered in Catalog 51, a 48-pp book of practical facts on movable metal walls. Stresses ease, speed, economy with which these walls may be erected, dismantled and relocated. Neat appearance, adaptability, sound control, ease of wiring, durability, available finishes and ease of maintenance are explained. Complete line of movable walls, partitions, wall linings, ceilings, railings, counters, cabinets and accessories are described and illustrated. The Mills Co.

122 Versatile Building Material—This excellent 20-pp booklet is filled with application data on Douglas fir plywood. Explains its advantages, properties, types and grades. Discusses its use in floor construction, roof and wall sheathing, siding, interior paneling. Also discusses exterior and interior finishing of this plywood and its use in concrete form construction. Douglas Fir Plywood Association.

123 Drilled and Poured Foundations—This informative 24-pp brochure covers types and applications of foundation structures, pressure grouting, drainage, dewatering, shoring and sub-surface soil exploration, illustrating and describing them by means of case histories. Includes tables on estimating drilled and poured foundation piling and caissons. Of particular interest are tables on volume of different diameter caisson bells in relaton to various size shafts. Please give title when requesting booklet. Casey & Case Foundation Co.

124 For Sure Footing—This newly published technical bulletin illustrates, describes, and gives application and safe load data on open steel diamond and welded gratings, stair treads and surface armor for old and new floors. Includes information on a flexible floor armor and a reinforcement mesh for ganister linings. Wm. F. Klemp Co.

MAINTENANCE

125 Spray Painting, Fast and Easy—This circular covers a line of paint spray equipment designed for speedy and economical performance. Describes and pictures guns, paint containers, air conditioners, syphons, pressure tanks, spray booths and exhaust units. Special features of company's gun and atomizer head are explained in detail. The Black Mfg. Co.

126 Heat-Resistant Finish—An improved silicone-base heat-resistant finish for metal products is described in this bulletin. Gives resistance characteristics and cites specific performance records under high temperature conditions. Midland Industrial Finishes Co.

127 Anti-Corrosion Coating — Excellent corrosion resistance with cost savings is claimed for Zinciate, a one-coat, self-protecting, anti-corrosion coating described in 8-pp Bulletin 100. This technical booklet presents case histories on typical applications showing the coating's resistance to severe abrasive and corrosive conditions; gives complete specifications for the two formulations, and includes data on surface preparation and methods of applications. Industrial Metal Protectives, Inc.

128 New Floor in Minutes—This folder describes an instant-use, ready-mixed plastic floor patching or resurfacing material which can be applied after wire-brushing the broken concrete or worn portion and is ready for use within 5 min. Gives illustrated directions for applying this resurfacer, explains how it gets tougher with use, stresses economy. Dura-Tred Co.

129 Scaffolding the Quick Way—Form PS-26 gives up-to-date information on a line of time-saving scaffolding and accessories. Describes and illustrates sectional scaffolding, chimney scaffolding, carpenter's scaffolding, mason's T jacks, scaffold jacks, motar board stand. Stresses safety, simplicity and quick-erection features. Wilson-Albrecht Co., Inc.

130 Vacuum of All Work—Form 130, 2 pp, describes and pictures company's popular heavy-duty portable suction cleaner which recovers both wet and dry materials and is adapted for use on floors, walls, or ceilings, for dusting jobs, machine cleaning, etc. Gives specifications, operating data. Includes price list for cleaner and accessories. Doyle Vacuum Cleaner Co.

131 Lightweight Ladders—Form PS 22, a small illustrated folder, describes briefly a line of aluminum ladders designed to give maximum safety and service without being cumbersome, and available in standard, light and heavy duty construction. Covers straight and extension ladders, industrial stepladders, also sectional ladders, extension trestle, platform stages. Gives weights, sizes. Wilson-Albrecht Co., Inc.

132 How to Prune Trees—Some good tips on how to look after the trees on the plant grounds, with a view toward protecting both worker and tree, are contained in this 16-pp pocket-size folder. Illustrates good pruning practices, proper equipment. Describes in detail lightweight aluminum and magnesium sectional poles, and also a new plastic insulator pole to provide increased safety around power lines. J. B. Sebrell Corp.

TOOLS, MACHINE SHOP EQUIPMENT

133 Professional Wrenches — Forty-pp Catalog W-51 provides excellent ordering and application data on an extensive line of wrenches and features company's Nugget line of socket wrenches with double-duty drive. Covers box, open-end, socket, tension type wrenches, master assortments, wrench stands, service tools. Contains helpful guide to wrench and socket sizes for bolts and nuts, quick-reference index, is generously illustrated with photos. Blackhawk Mfg. Co.

134 Bending Manual — "It's Easy to Bend" is a 32-pp booklet filled with information on bending metals. Although numerous illustrations show company's benders, the ideas contained apply to any rotary type bending machine. Besides providing suggestions on the choice of materials and bending machines and discussing tooling it gives illustrated instructions on practically all types of bending. O'Neil-Irwin Mfg. Co.

135 Power Setter—An automatic power setter for hand and band saws, described in this illustrated bulletin, sets both rows of teeth at the same time. Photos show how only three simple adjustments are needed to operate setter and text explains how it makes an easy, quick job of saw setting. Special features are described, setting times listed. Specifications, price included. Foley Mfg. Co.

136 Lathe Attachment—A low priced, vertical rotary attachment which permits a lathe to do precision jig boring, drilling, reaming, circular milling, graduating, is introduced in this bulletin. Standard model fits 9-in. South Bend lathe, other models available. Attachment is pictured, important features described. Alian Mfg. Co.

PUMPS, COMPRESSORS

137 Rotary Pumps—Catalog 951, 8 pp, covers a line of rotary pumps for pressures up to 1000 psi for manufacturing, process and petroleum applications, giving sizes, capacities. Explains operating principle of pumps in this line, illustrates construction features of various models. Also shows some examples of custom-built rotary pumps. Geo. D. Roper Corp.

138 Screw Pumps—Revised Bulletin S-304 illustrates and describes screw pumps in capacities to 3000 gpm, pressures to 200 psi on low viscosity liquids which flow into pump inlet. Explains basic construction and design details. Data provided covers both horisontal and vertical types, giving specifications, dimensions, application information. Includes selection chart. Warren Steam Pump Co., Inc.

139 Gas-Engine-Driven Compressors — Forty-pp Bulletin 104 introduces the HBA compressors, recent additions to company's "Big Angle" line of gas-engine-driven compressors. These are two-cycle high compression units designed for simplicity, compactness, easy maintenance and more power at lower cost. Describes and illustrates 5, 6, 8 and 10 cylinder models of 1100 to 2200 Bhp capacities. Lists major advantages. Sectional drawings show construction and design features. Includes specifications, dimensions. Installation photos show how units fit into modern compressor stations. Clark Bros. Co., Inc.

PIPING, VALVES, TRAPS, ACCESSORIES

140 Steel Pipe—Bulletin 370, 32 pp, covering company's CW steel pipe, includes black and galvanized pipe in standard sizes from ⅛ in. to 4 in., with tables of dimensions, weights, test pressures, threading data, and bundling schedules. Modern fabrication methods, and development and application of closer controls on mechanized fabricating processes are emphasized. Illustrated in color, booklet presents story of pipe's manufacture from skelp through heating furnace, the continuous welding process, finishing. Spang-Chalfant Div., The National Supply Co.

142 Water-Pressure Reducing Valve—Six-pp Bulletin W-3 shows general arrangement of company's cushioned water pressure reducing valve and reducing pilot valve, along with a detailed list of parts. Installation, operation, adjustment, serv-

(Continued on page 107)

FIRST CLASS
PERMIT No. 353
Sec. 34.9 P. L. & R.
CHICAGO, ILL.

BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed In the United States

POSTAGE WILL BE PAID BY—

PLANT ENGINEERING
110 South Dearborn
CHICAGO 3, ILLINOIS

Bring them down with these DAYTON Cog-Belt* "teeth"

- 40% more h.p. per belt
- fewer belts
- fewer pulley grooves
- longer belt life

Switch to premium Dayton Cog-Belts and watch the cost of power transmission come tumbling down. Original cost is less. 5 Dayton Cog-Belts do the work of 7 ordinary V-Belts.

You save drive space. Cog-Belts let you use up to 25% shorter center-to-center pulley distances.

Cogs are the *only* V-Belts scientifically built to bend, like your finger. They withstand flexing and compression strains better, run cooler, last longer.

To get shut of V-Belt troubles for the duration, to save money and drive space, give your Dayton Distributor the "high-sign" of better V-Belt power transmission: the arched finger that means Dayton Cog-Belts and important savings!

COGS FIX FLATS!

Dayton Cog-Belts converted a compressor drive in a railroad shop, from a flat drive that averaged 6 breakdowns a year, to a trouble-free V-flat drive now going into its tenth year of service. Cogs need no special pulleys, grip so well they convert flat to V-flat with only one pulley change!

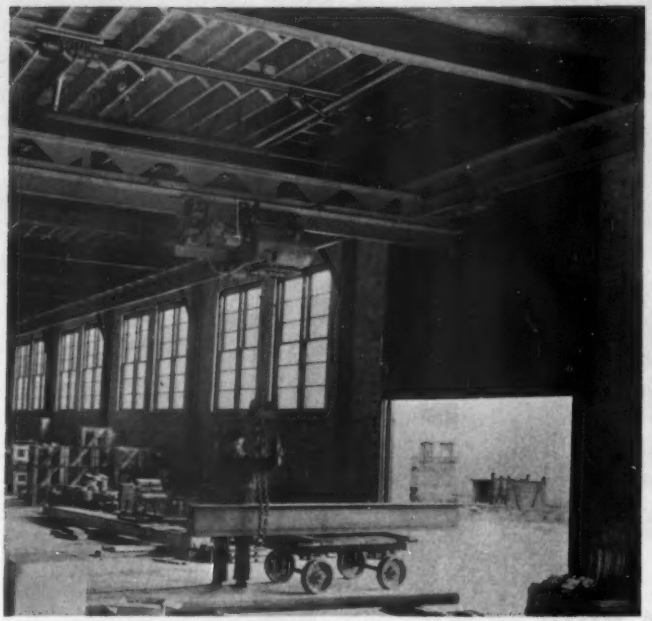
DAYTON RUBBER COMPANY • DAYTON 1, OHIO

V-Belts by **Dayton Rubber**

*T.M.

WORLD'S LARGEST MANUFACTURER OF V-BELTS

Improved Overhead-type Doors...



Barcol OVERdoors

meet the needs of any plant

ALL-VERTICAL DOORS

LOW HEADROOM DOORS

HIGH LIFT DOORS

STANDARD DOORS

...with Electric Operators to match the doors

BARCOL

For example, in the picture above, this Barcol OVERdoor was built with an extended headroom or high-lift arrangement to clear the craneway situated above and inside the door opening. The various types of Barcol OVERdoors are widely used in industrial plants of all sizes for exterior doors (on railway track entrances, truck drive-ins, loading docks, and the like), for interdepartmental interior doors, for company garages, for employee garages, and other purposes. Your Barber-Colman representative is equipped to give you full information on possible applications of Barcol OVERdoors—look for his name in the "yellow pages" of your telephone book.

FACTORY-TRAINED SALES AND SERVICE REPRESENTATIVES IN PRINCIPAL CITIES

BARBER-COLMAN COMPANY

103 MILL STREET, ROCKFORD, ILLINOIS

BARCOL

(Continued from page 34)

driller knows how far he is from the point where he should stop drilling.

The valve seat measures 7 in. in diameter and the valve ball is 3¼ in. in diameter. Both units are capable of withstanding pressure of 5,000 psi at 1520 F. *From This Formica World, a publication of The Formica Co., Cincinnati 32, Ohio.*

Salvage Dollars Come From the Floor

THE SALVAGE program at Briggs Manufacturing Co. incorporates several material-saving techniques. Last August an experimental operation was undertaken at the Mack plant to recover small standard

Shaker removes waste material from floor sweepings and screens small parts

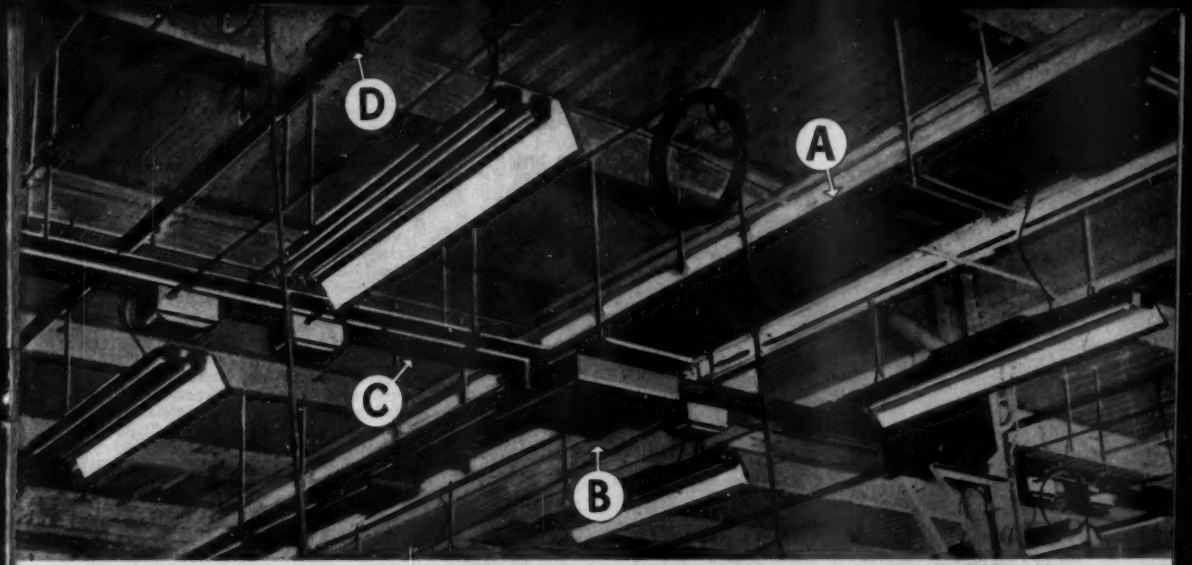
parts lost or dropped in production. Four months after the project was begun, 708,576 pieces were returned to production lines.

This represents a considerable saving, especially when you consider that they were salvaged entirely from floor sweepings and would otherwise have been a total loss. *From The Briggs Assembler, a publication of Briggs Manufacturing Co., Detroit 34, Michigan.*

Watertight Concrete

THE DEMAND for watertight concrete has been growing rapidly with the increasing use of portland cement. Careful examination of structures has invariably shown that leakage is confined to relatively small areas, while the remainder of the structure is satisfactory. This indicates that the principal causes of leaky structures are improper construction methods rather than the use of poor materials.

Tests have indicated that concrete containing 5.5 gal of mixing water per sack of cement is watertight when cured seven days. When 7.5 gal of mixing water are used, the concrete is not watertight until cured



MAIN FEEDER AT SEALED POWER CORP. Trumbull LVD FLEX-A-POWER high-capacity feeder (A) distributes power through plant with minimum voltage loss. Can be dismantled, relocated with complete salvability. Tap box (B) takes off power for FVK secondary feeders (C). 600-4000 amperes. LTG (D)—see below—is used for lighting. Bulletin TEB-1.

SECTIONALIZED POWER FEED

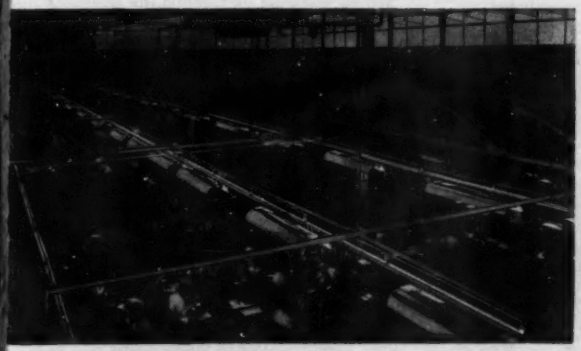
is ready for quick conversion

No plant... few buildings... can foretell what its power requirements will be months—or days—ahead.

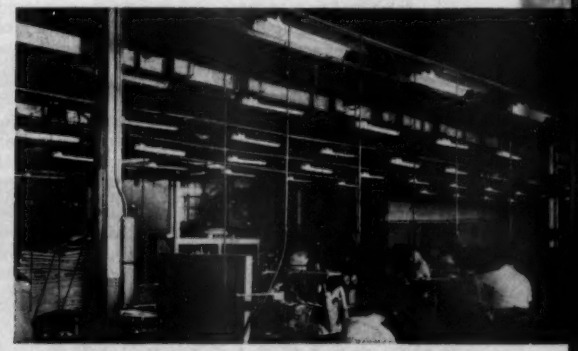
But with FLEX-A-POWER® handling the electric power distribution from main switch or breaker to machine or lamp... any new requirement, additional load or rearrangement of load, can be easily met.

This system of standard-section busways gives utmost flexibility in power take-off, and, if necessary, can be taken apart for quick relocation. Easier to install than wiring and conduit—and more economical—it is ideal for a period when emergencies may develop, when conversion may be necessary.

Write us for literature on the types that interest you.



LIGHT-DUTY BUSWAY AT PESCO PRODUCTS Division of BORG-WARNER CORP. Use of LTG FLEX-A-POWER to distribute power to tools and lighting fixtures permits quick changes in machine layout without delay for rewiring. Busway can be tapped *at any point* by plug or trolley—every inch an outlet. Rated 50 amperes. Bulletin TEB-2.

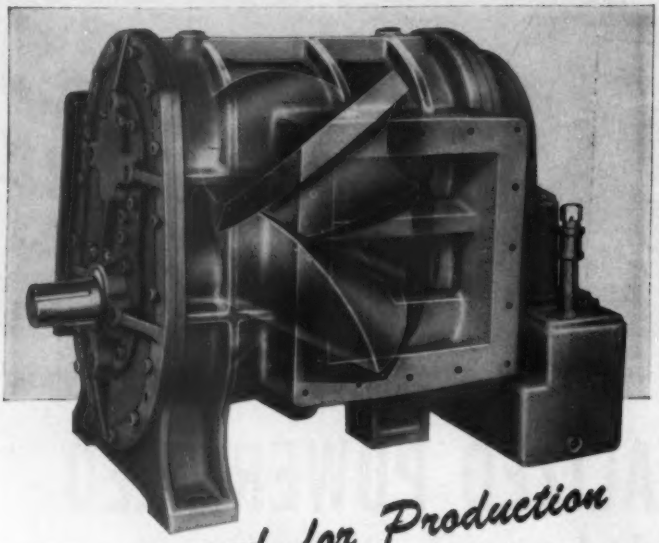


SECONDARY FEEDER AT PESCO PRODUCTS Division of BORG-WARNER CORP. Nearly ¾-mile of 600 amperes, 440 volt Trumbull FVK FLEX-A-POWER takes power from a panelboard in parallel runs over entire area. 15 outlets to each 10-ft. section. No expensive rewiring needed when relocating loads. Can also be easily dismantled and re-installed. 225-1000 amperes. Bulletin TEB-4.

TRUMBULL (T) ELECTRIC

THE TRUMBULL ELECTRIC MANUFACTURING COMPANY, Plainville, Conn.

The STANDARDAIRE Axial Flow BLOWER ~



Engineered for Production

TO MEET the increasing demand for Standardaire Blowers our manufacturing facilities have progressed from custom built techniques to precision production methods for the principal components of the blower. In addition to other improvements, new manufacturing processes and equipment are now being used to generate the cycloidal form, screw type main and gate rotors on a production basis without sacrificing precision and accuracy of fit—important details in maintaining the "air screw" action feature of the Standardaire Blower.

Through this unique achievement in production engineering it is possible for Standard Stoker to offer industry a Standardaire Blower with the design features and efficiency of a custom built job at the availability of a quantity production unit.

Consult with our engineers on how the modern design Standardaire Blower can be adapted to suit your requirements. Write Dept. E2 The Standard Stoker Co., Inc., 370 Lexington Avenue, New York 17, New York.

THE STANDARD STOKER CO., INC.

Standard Stoker 556

NEW YORK • CHICAGO • ERIE • YORK • MONTREAL

14 days. When 9 gal of mixing water are used the concrete is not watertight after 28 days of curing and probably never would develop true watertightness.

It is recommended that not more than 6.0 gal of mixing water per sack of cement be used in making watertight concrete. This amount includes the water in the rock and sand used. If the mixture is too stiff or hard to properly compact, additional cement and water in the correct proportion can be added to loosen the mixture to assure proper placement. This increase in cement paste content will make a more workable concrete. Experience has indicated that not less than six sacks of cement per cubic yard of finished concrete are required.

Keep the concrete wet for at least seven days when standard portland cement is used—or three days if high early strength cement is used. Remember always that curing is extremely important in bringing out the watertight properties of good concrete. *From This Earth, a publication of Henry J. Kaiser Co., Oakland, Calif.*

Unloading Raw Materials

GETTING RAW materials into the plant is the first step in production. The unloading of these raw materials from freight cars is a giant task, but the unloaders at Lever Brothers, Co. tackle this job daily with such raw materials as fats and oils, acids, silicates, caustics, phosphates and soda ash.

Just as each type of material is shipped in a different kind of freight car, so each must be unloaded in a different way. Tank cars, which transport liquids like fats and oils, caustics, acids and fuel oil, are emptied by pumping or blowing the liquid with compressed air through pipes directly into storage tanks both above and below ground.

Powdered chemicals like phosphates arrive in hopper cars and are unloaded by means of flexible hoses, 6 in. in dia, which suck the powders from hopper cars up as high as six stories to nearby storage bins. *From Lever Standard, a publication of Lever Brothers Co., New York 13, N. Y.*

Flexible tubes at right suck phosphates from hopper car into upper storage bins

BUDA 2000 LB FORK LIFT TRUCKS

4TH NATIONAL
MATERIALS
HANDLING
EXPOSITION
INTERNATIONAL AMPHITHEATRE
CHICAGO
APRIL 30-MAY 4
1951

BUDA

THE LINE WITH ALL 3 FOR DIVERSIFIED HANDLING

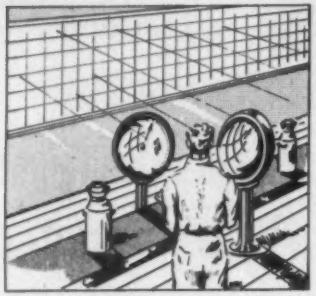
MAINTENANCE & OPERATION

of buildings, utilities and facilities

Here's How to Solve Your Reflection Problem

Submitted by
Walter H. Harvey, Chief Engineer

We have a problem in reading the dials on the milk weighing scales. The man recording the weights is greatly affected by the glare from the glass dial. The outline of each



Reflection from glass dial made it difficult for worker to read figures on scale

6 by 6 in. glass block and the intensity of light coming through the blocks is clearly reflected into the eyes of the man reading the scale even on dark or cloudy days.

The use of polaroid glasses has helped some, but we would not like to have the man continually use them. We also installed a light at an angle, showing down on the dial and this has been helpful. We thought of using curtains or blinds but decided against it because we would lose too much light.

Contributed by T. Ulcman,
Pittsburgh Plate Glass Co.

One convenient way of reducing these reflections would be to tilt the scale cover glass towards the observer at the top so that the reflected light would fall below his eye level. This is currently being done on a number of television receivers to reduce bothersome reflections.

If the scale dial is very close to the cover glass, it might be possible to make some improvement in the situation by lightly etching the glass surfaces to break up and diffuse the reflected light. This procedure is not practical, however, if the dial is more than a ¼ in. away from the glass.

Another approach to this problem would be the application of reflection-reducing filaments to both surfaces of the cover glass.

Four Steps in Insulating Tank

THE APPLICATION of insulation and weatherproof finish on an outdoor storage tank illustrates the four steps for insulating large, cylindrical vessels. The tank, which will operate at 270 F, is being insulated with 1-½ in. thick mineral wool blankets, in 24 by 48 in. sections, covered with expanded metal lath on one side and wire netting on the other.

Photo: Industrial Mineral Wool Institute

Photograph shows four steps, from bottom to top, for insulating outdoor tank

The four steps, from bottom to top, are illustrated in the photograph: 1. Mineral wool blankets, metal lath covering on the outside, are tightly butted together and secured to the tank by 1 in. galvanized iron bands encircling the tank on 9 in. centers. 2. A single ¾ in. layer of insulating cement is trowelled into the metal lath covering. 3. One-inch mesh wire netting is stretched over the dry cement. 4. A coat of asphalt mastic, ⅛ in. thick when dry, is trowelled into the wire netting and smoothly surfaced to finish the tank insulation.

The insulating materials are designed to maintain the temperature

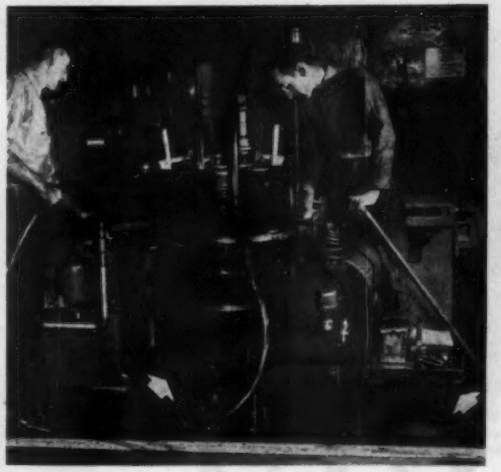
Pipe Lengths Provide Crane Anchor for Pumps

Contributed by S. Sievilla
Allis-Chalmers Mfg. Co.

OUR LUBRICATING department, here at Allis-Chalmers', has three barrel-on-truck type vacuum pumps for removing oil and water which seeps into various test pits at the West Allis Works.

Some difficulty was experienced in finding a safe place to fit a rope on the pump when hoisting it by crane into and out of the pits. To correct this situation, 1 in. lengths of ¾ in. pipe were welded at four points to the underside of the trucks as shown by the arrows.

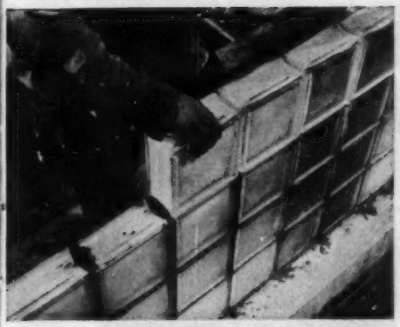
These attachments prevented the rope from slipping off and causing possible damage to the equipment or injury to the workers. It also provided for the safe handling of the trucks without the use of protruding hooks.



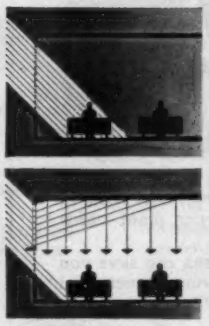
Arrows point to two of the short pipe lengths welded to pump trucks to provide a safe place for hoisting rope to be fastened

Exclusive new face finish on light-directing Insulux Glass Block cuts cleaning costs!

New economies for Daylight Engineering



Installation speed goes up! The new gold stripe makes it easier and faster to identify inside top of block.



Direct sun causes uncomfortable brightness near windows, extreme contrast elsewhere in room. Insulux Fenestration directs and spreads daylight to ceiling, keeps brightness at comfortable levels.

Now, a brand-new finish on Insulux Light-Directing Glass Blocks virtually eliminates post-construction cleaning expense! Even the hardest, dried-on mortar rubs off quickly and easily. No longer is it necessary for costly, time-consuming cleaning to take such a large part of your installation dollar.

Important as this plus feature is, it's only incidental when compared to the *lifelong advantages* an Insulux Fenestration System installed on Daylight Engineering principles gives to any building. Supplies of the new block and all of the materials needed for fast installation are *non-critical and immediately available.*

The knowledge and experience of a Daylight Engineer is at your service. Just call or write: Daylight Engineering Laboratory, Dept. P. E. 4, Box 1035, Toledo 1, Ohio. Insulux Division, American Structural Products Company, subsidiary of Owens-Illinois Glass Co.

INSULUX GLASS BLOCK

INSULUX FENESTRATION SYSTEMS

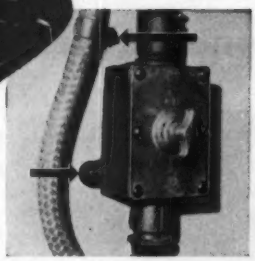
—by the pioneers of Daylight Engineering

ONLY 40 SECONDS

FROM HERE

TO HERE

for fastening into steel or concrete, for the 1000-and-1 jobs in any industrial plant. Takes only hours instead of days to install tool cribs, piping, partitions, electrical services, roofing, siding, air conditioning, fences, signs and other plant maintenance or extension work.



You can't beat RAMSET SYSTEM for quick, easy fastening into steel, concrete, masonry and other suitable materials. Takes less than a minute per fastener, from start to finish. Sturdy, simple, reliable, portable RAMSET TOOLS instantly set any of 76 sizes and types of fasteners, using graded power charges to insure tight, permanent fastenings.

RAMSET SYSTEM reduces time from 60% to 90%, cuts costs in proportion. Today, when time counts most, your plant needs RAMSET SYSTEM for sure, fast, low-cost fastening.

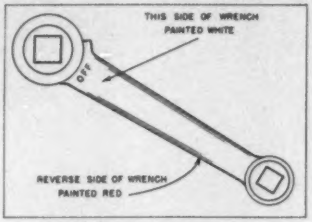
Ask for 15-minute demonstration of how RAMSET can save you precious time and help you get production moving sooner, and keep it moving. *Ramset Fasteners, Inc., 12117 Berea Road, Cleveland 11, Ohio.*

Member of Producers' Council

Ramset Fastening System
Pioneer in powder-actuated fastening

of the tank contents under all weather conditions with minimum maintenance and repair.

Paint Identifies Wrench Position



By painting a different color on each side of the handle of a valve ratchet wrench, time can be saved in identifying wrench position when turning valves "on" or "off," left or right

Battery-Handling in Confined Space

TO GET MORE ton-miles per battery and lower battery and handling costs, it might be well to examine the method used by The Wallingford Steel Co., Wallingford, Conn. They have designed a simple, homemade battery rack for handling their walkie batteries and have effected a short-haul layout for placing truck batteries on charge. These engineering achievements, according to Gould-National Batteries Corp., not only eliminate manual handling of truck batteries, but also gain maximum usefulness of every cubic inch within the battery alcove, measuring only 15 ft wide by 25 ft long by 8 ft high.

The battery rack is made of structural steel members mounted on casters. Upright members are spaced so that the walkie batteries can be lowered between them. The members cradle the battery and prevent it from falling when the rack is pushed from the unloading point to the charger.

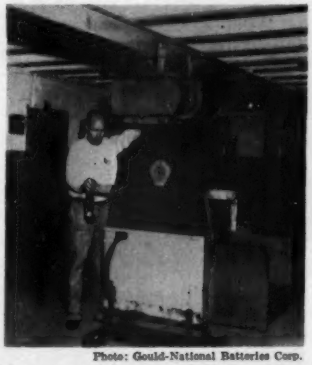
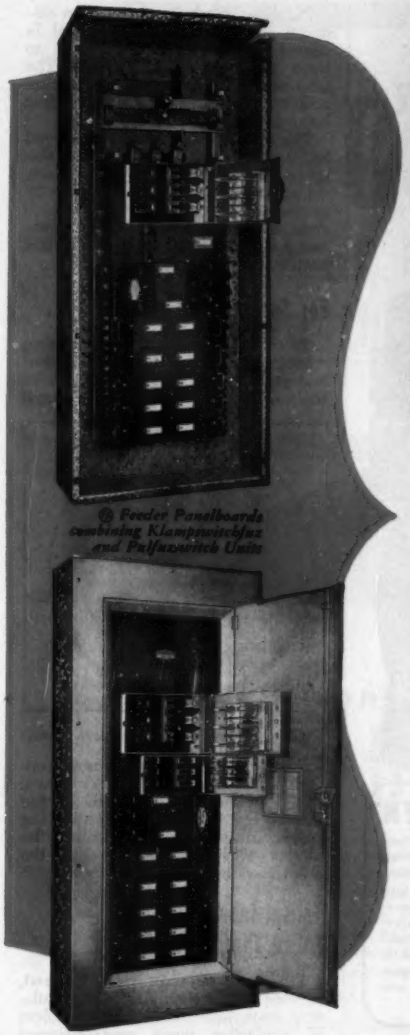


Photo: Gould-National Batteries Corp.

Hoist pulley with spreader-bar eliminates manual handling of batteries



Ⓕ Feeder Panelboards combining Klampswitchfuz and Pulfuzswitch Units

For Efficiency, Safety and FASTER DELIVERY It's STANDARDIZED Ⓕ FUSE-TYPE FEEDER PANELBOARDS

In times like these, when plant facilities must be expanded or modernized, Standardized Ⓕ FUSE TYPE FEEDER PANELBOARDS, are particularly ideal.

Recently re-designed, inside and out, to minimum space requirements . . . without sacrificing such popular features as generous wiring space and ease of installation . . . these improved, compact feeder panelboards are built of standardized units and assembled, as required for specific application, thus *facilitating deliveries.*

Four standardized widths, ten standardized heights and three standardized depths of boxes meet any requirement. Boxes are shipped from stock . . . with removable ends to permit drilling of conduit openings on the job. Too, panels are readily installed after boxes are in position.

Two dependable Ⓕ Switches . . . the Ⓕ PULFUZSWITCH and the Ⓕ KLAMPSWITCHFUZ . . . make these feeder distribution panelboards the finest in safety and efficiency. Both types combine switch and fuse in one unit so that current is OFF when the door is opened, or the fuse carrier removed. This makes replacement of fuses safe . . . quick . . . simple.

For operating switch requirements, Ⓕ Shutlbrak Type A, Quick Make and Quick Break Interlocking Switches are available in the same standardized construction.

***Ⓕ PULFUZSWITCH** capacities: 30, 60 and 100 amps, 250 volts AC or DC, 30; and 60 amps, 600 volts AC in 2, 3 and 4 pole.*

***Ⓕ KLAMPSWITCHFUZ** capacities: 30 to 600 amps, 250 volts AC or DC; and 30 to 200 amps, 600 volts, AC in 2, 3 and 4 pole types, single or double throw.*

***Ⓕ SHUTLBRAK** capacities: 30 to 600 amps, 250 volts AC or DC; and 600 volts AC in 2, 3 and 4 pole types.*

For more information about the standardized Ⓕ Fuse-type Feeder Panelboards, talk it over with your Ⓕ representative (he's listed in Sweet's).

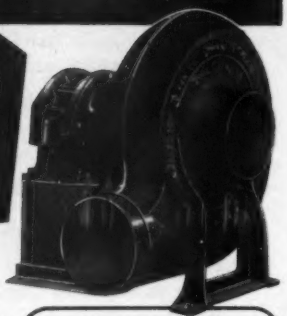
FA TRADE MARK

Frank Adam Electric Co.

Our 60th Year... ST. LOUIS 13, MISSOURI

Makers of BUSDUCT • PANELBOARDS • SWITCHBOARDS • SERVICE EQUIPMENT • SAFETY SWITCHES • LOAD CENTERS • QUIKHETER

FANS
any size you need—all
HEAVY-DUTY



We shipped the three big fellows shown above to a steel plant — installed in a large building containing gas engines generating electricity. The fans provide ventilation by diluting the escaping toxic gas fumes to such a low concentration that workers' health and comfort are no longer impaired. Each of these Clarage Type W Fans handles 150,000 cubic feet of fresh air per minute at 2" static pressure — each driven by a 100 HP motor *in continuous operation.*

300 to 4000 CFM

Or perhaps you need small fans — for ventilation, for removing excess heat, smoke, odors, or more special applications. Clarage Cast Iron Exhausters can be your economical answer to such requirements. Built with cast iron housings, they *offer long resistance to corrosion.* Many have seen more than 25 years of service — and still going strong!

When you buy Clarage air handling and conditioning equipment, you buy the best. *We don't go in for flimsy, light weight constructions.* Clarage equipment — from our smallest sizes to the largest fans we build — is HEAVY-DUTY to save you a great many dollars in the long run.

CLARAGE FAN COMPANY—*Kalamazoo, Michigan*

CLARAGE
—HEADQUARTERS for Air Handling and Conditioning Equipment

SEE OUR CATALOG IN SWEET'S

It pays to direct fan inquiries our way . . . phone Clarage office in your city, or write us at Kalamazoo.

Application Engineering Offices in All Principal Cities

Platform trucks pull up to an all-metal stop, mounted on vertical I-beams set in the concrete floor, to have their batteries changed. The stop prevents incoming trucks from accidentally ramming and damaging batteries being charged.

The truck batteries are removed by a pick-up element on the spreader-bar. To save head room, the spreader-bar is attached directly to the hoist pulley-housing which runs on an I-beam. The spreader-bar is also used for changing walkie batteries.

For Secure Valve Wheels

THE NUT holding the operating wheel of a valve frequently loosens and permits the wheel to drop from the valve and become lost. To help

Shellac threads for secure valve wheels

prevent this, remove the nut from each valve (whether old or new), apply shellac to the threads on the end of the stem and retighten the nut securely. Upon hardening, the shellac will tend to cement the threads.

Helical Inserts Speed Thread Repair

THE MAINTENANCE department, serving one of New York City's subway lines, has the frequent problem of replacing worn and stripped threads in the axle-cap bolt holes of its subway car motor-frame castings. Repair of these holes is expedited by the use of stainless steel helical-wire thread inserts.

These inserts permit the use of the same size cap screws in the repaired holes as were used in the original holes. This eliminates the need of drilling out larger clearance holes in mating parts. The inserts also provide threads that are stronger, more wear-resistant and more corrosion-resistant than the original threads.

In one particular instance, threads in a motor frame were badly worn. The original holes had 1-9/32-7 tapped threads. The holes were repaired by: (1) drilling out with a 1-21/64-in. drill, (2) tapping with a

OCS*

Killer of Many Belts before their time

*Overcured Sections — present every 30′ to 40′ in all belts made by the flat press method. Only Rotocuring eliminates this major cause of belt failure.

...but you won't find this common cause of failure in BWH ROTOCURED BELTS!

In the flat press method of curing, a segment of the belt is double cured every 30 to 40 feet. These overcured segments of 2″ to 4″ in width across the entire belt can't be avoided in flat press curing because the previously cured sections are advanced each time less than a full press length. Result: a number of structurally weak, failure-inviting segments (the exact number depending on the length of the belt).

With BWH ROTOCURED belts there are no overcured segments because the vulcanization is *continuous*. You as a belt user benefit *4 ways:*

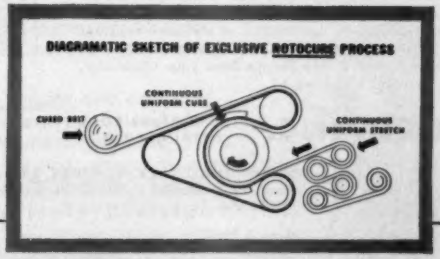
1 You get uniform, abrasion-resistant covers *overall.*

2 You get improvement of flex life up to 40%.

3 You get no mechanical distortion (inherent with flat press curing at the press ends).

4 You get constant uniform stretch *always.*

These product advantages are why BWH ROTOCURED conveyor belts last longer, require less maintenance and lower the cost per ton of material conveyed. You get them too in BWH transmission belts, plus a higher coefficient of friction (no dusting agents required with Rotocure—hence tensions are minimized and belts last longer). Call in your BWH distributor or write us direct for complete details.



BWH DEPENDABLE RUBBERWEAR

Another Quality Product of

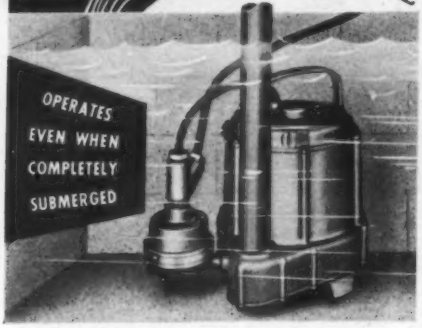
BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all Principal Cities

PLANT: CAMBRIDGE, MASS. • P.O. BOX 1071, BOSTON 3, MASS., U.S.A.

Be Ready ...WITH A KENCO UTILITY PUMP To Stop Down-Time Losses

AMAZING CAPACITY - 3300 G.P.H.



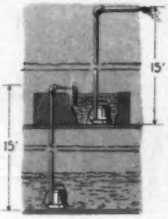
Maintenance Crews Protect Plant Operation Against Losses From Unexpected Emergencies With Kenco Utility Pumps.

They Pump Water From Boiler Pits, Elevator Pits, Drainage Trenches, Excavations and Depressions, and For Transferring Liquids From Tank to Tank.

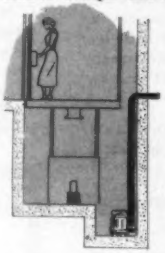
Kenco Utility Pumps Require No Installation Time or Expense.

The new amazing Kenco Submersible, Electric Utility Pump never fails to operate as long as there is electric current. Operation is completely automatic. The exclusive Kenco Liquid Level Switch, rated at over one hundred thousand off and on cycles, turns on the pump automatically when air pressure, created by water rising in the switch skirt, actuates the starter control. Manual starting on the Utility Model is obtained with a hand switch. This is used when it is desired to start pumping at any water level less than that required to start the pump automatically. There is no float to stick, warp, corrode or leak. The Liquid Level Switch is protected against fouling by debris or silt. Compact, portable, the Kenco Utility Pump can be used where it would be impossible to install conventional type pumps. Power failure cannot harm either switch or pump. When power is restored, pump with its hermetically sealed motor instantly resumes operation, although it has remained completely submerged. Ruggedly constructed of corrosion resistant bronze. Capacity: 3300 G.P.H. at discharge head of ten feet. Order Kenco Utility Pumps from your wholesaler, or send coupon for Catalog 51.

Protects Plant Operation Against Down-Time and Reduces Damage and Loss From Emergencies.



Provides Multiple Protection At Low Cost Wherever Volume of Water To Be Handled Changes Quickly.



Elevator, Boiler Room and Public Utility Understreet Pits Pumped Dry.

KENCO, INC. 1125 N. RIDGE ROAD LORAIN, OHIO

KENCO, INC., 1125 N. RIDGE RD., LORAIN, OHIO
Please send Catalog 51 on Kenco Automatic, Submersible, Electric Utility Pumps.

Name & Title_____
Company_____
Kind of Business_____
Street_____
City & State_____
Dept. PE

Photos: Heli-Coil Corp.

Left, operator is installing stainless steel thread insert. Right, insert already installed and one shown alongside

special oversize tap identified with a 1-9/32-7 marking, and (3) installing a stainless steel thread insert to bring the hole back to size. The insert has threads on its outside diameter conforming to the special tap and internal threads conforming to the original 1-9/32-7 thread. The operation was completed in 55 min.

Welding Machines Hung From the Ceiling

HANGING WELDING machines from the ceiling has given the Springfield, Mass., plant of Harvey-Whipple, Inc., many advantages. In addition to important savings in floor space, the ceiling location provides better ventilation and keeps the machines from being bumped or jarred.

Since it is not necessary to have the usual long, across-the-floor runs of welding cables, the cables are rarely subjected to abuse and thus last longer. Because he can hang his cable directly on the welding machine the operator has plenty of room to clean the work area of scrap and dirt.

Due to the inverted installation, covers can be removed to facilitate inspection and allow better circulation of the ventilating air. The installation consists of 19 Westinghouse a-c welders which are readily adaptable to this type of mounting.

Being upside-down doesn't bother the 19 welding machines at Harvey-Whipple

EXCLUSIVE DUAL TORQUE TUBE

Add a Pilot or Switch— Get Double Duty with the BS&B "Climax"

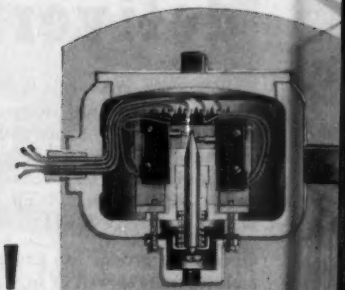
LIQUID LEVEL CONTROL!

• The revolutionary new housing design of the BS&B "Climax" Type 888 Liquid Level Controls permits the use of two torque tubes with appropriate pilots or switches. One controller can operate two pilots (direct and reverse, if desired) or a pilot and a magnetic switch. Or additional electric circuits can be controlled through the use of pressure switch set in output line of pilot.

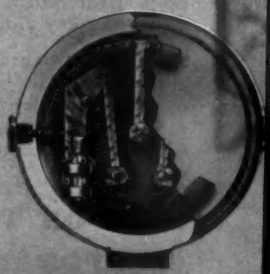
Safety alarm controllers may sound alarm gongs or klaxons, start or stop pumps, open or close colored position light circuits.

Investigate these "extras" today. Write for new, complete catalog Section 103 on the Type 888, the new liquid level controller with more than 12 years' development behind it.

BLACK, SIVALLS & BRYSON, INC.
Climax Controls Division
7502 East 12th Street, Adv. Dept., Room 52P
Kansas City 3, Missouri



Type 2112 Explosion-Proof Pressure Switch, designed to operate as many as three circuits from any pressure source with as much as five pounds range. Unique diaphragm-operated design gives longer, trouble-free life. Gas-tight. Easily wired and mounted.

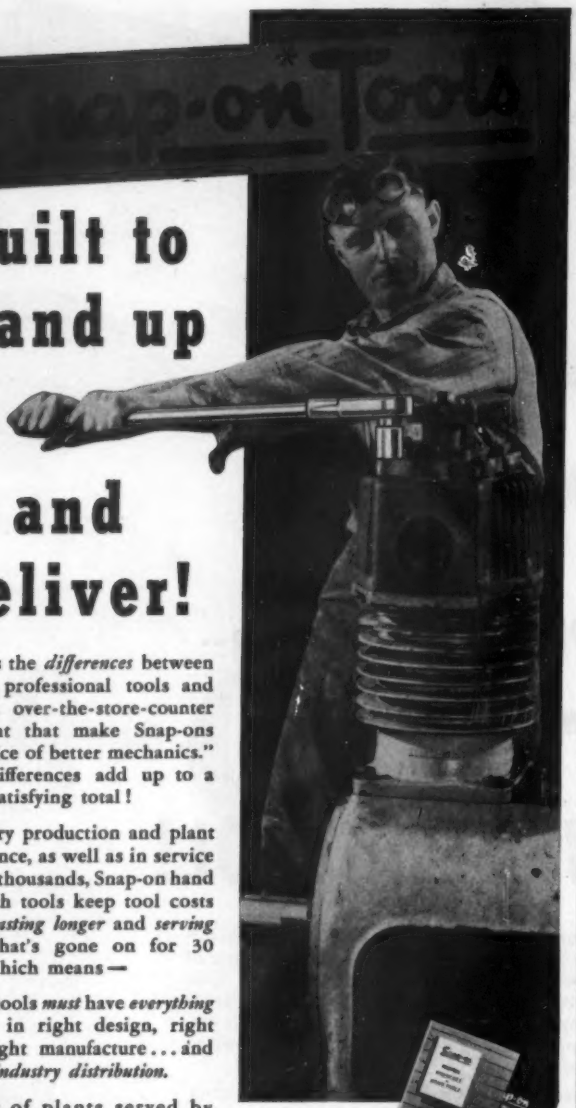


Type 2122 Magnetic Switch utilizes the turning movement of the Type 888 torque tube to actuate switches. Sensitive to a minimum change of 10% of the length of the displacement element. Explosion-proof cover. Mounts easily on any BS&B "Climax" liquid level control.

BS&B "Climax"
DISPLACEMENT LIQUID LEVEL CONTROL and SWITCHES

Snap-on Tools

built to stand up and deliver!



● It's the *differences* between Snap-on professional tools and ordinary, over-the-store-counter equipment that make Snap-ons "the choice of better mechanics." Those differences add up to a mighty satisfying total!

On factory production and plant maintenance, as well as in service shops by thousands, Snap-on hand and bench tools keep tool costs low by *lasting longer* and *serving better*. That's gone on for 30 years. Which means—

Snap-on tools *must* have *everything* it takes, in right design, right steels, right manufacture... and *direct-to-industry distribution.*

The list of plants served by Snap-on reads like a Blue Book of American industry. Exclusive national distribution through 41 direct factory branches. Write for catalogs.

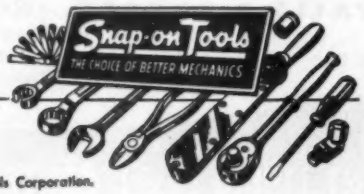
Write for your FREE copies of Special Industrial Catalog and 104-page General Catalog of 4,000 fine Snap-on Tools.

SNAP-ON TOOLS CORPORATION

INDUSTRIAL DIVISION

8068-D 28th Avenue

Kenosha, Wisconsin



*Snap-on is the trademark of Snap-on Tools Corporation.

Post Office Has Fewer Glass Pa(i)nes, Now

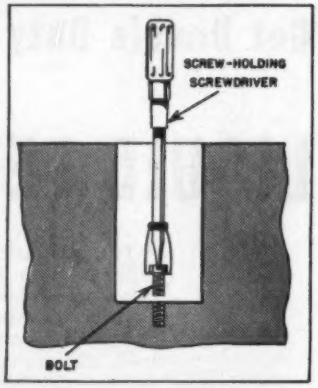
THE POST OFFICE in Chester, Pa., was troubled with glass panes cracking and breaking when long skylights were cranked open or closed. This problem was solved by replacing the glass panes with translucent

Photo: Rohm and Haas Co.

Glass panes in these long skylights have been replaced with Plexiglas panels

Plexiglas acrylic plastic. Strength and resiliency of the plastic panels withstands the twisting that sets in when skylights are raised for ventilation. In addition, the translucent panels diffuse more comfortable, glare-free, light through the interior of the building.

Starting Out-of-the-way Bolts



For starting a square or hex head bolt or cap screw in an out-of-the-way location where a socket wrench cannot be used, use a screw-holding screwdriver to start it by cutting a suitable slot in the top of the bolt head, as shown

Can-Opener That Reflects Heat

Contributed by General Electric Co.

A PROBLEM facing airport maintenance crews is the unsoldering operation required before they can repair delicate radio and indicating instruments.

The instruments are hermetically sealed in metal containers to protect them from dirt and moisture. Joining the sections together is a simple

Caster Quiz

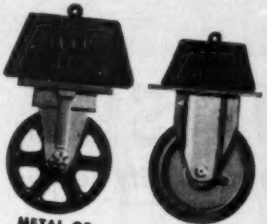
A "quick facts" feature with helpful suggestions on the use of casters . . . to reduce materials-handling costs, the "Reducible 30%"*

Q. How can light, portable equipment roll easier on rough floors or over obstacles?

A. On the amazing new Bassick "Flying Saucer" Caster. Its saucer-like 3" wheel, set at a 45° angle, rides over rough spots and obstacles equal to an ordinary wheel twice the size . . . with the extra asset of low overall height that cuts tipping danger. Low-cost. Ideal for shirt racks (below), shoe racks, garage equipment, etc.

Q. Should metal and rubber-tread wheels of equal size carry equal loads?

A. No. Figure that soft rubber-tread wheels should carry about 50% of the load carried by metal or hard-tread composition wheels of equal size.

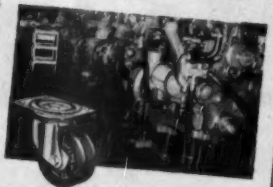


METAL OR HARD-TREAD

SOFT RUBBER-TREAD

Q. Is there a simple way to set up a controlled-movement, easy-rolling assembly line?

A. Use Bassick Grooved-Wheel Casters on angle iron track, as Cummins Engine Company, Inc., successfully does in assembling its diesel engines. This low-cost scheme gives controlled flow, easy movement, great flexibility. Track is easily installed, self-cleaning.



Q. When should only swivel casters be used on trucks?

A. For limited or confined areas where equipment must frequently move sideways to machines, bins, etc. This arrangement is not advised for long, straight travel, where a combination of swivel and rigid casters should be used for steering control.

Q. What's an easy way to raise and move heavy equipment?

A. A portable A-frame, on Bassick Casters, supports hoists, and can be moved throughout the plant to carry engines, heavy machine parts, etc. Bassick Heavy-Duty Casters (sizes for loads up to 10,000 lbs. or more per caster) add flexibility, in any direction, at any time.

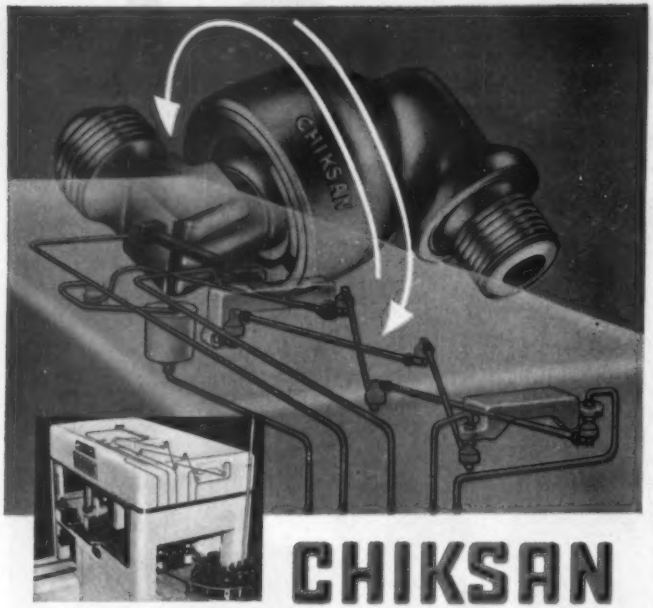
WHAT'S YOUR MATERIALS-HANDLING PROBLEM?

We'll be glad to show you how Bassick Casters can help solve it, or to hear how you've used casters to deal successfully with a particular difficulty. We'll pay $25.00 for any problem or case history that can be used in this advertising. Address the world's largest manufacturer of casters and floor protection equipment . . . THE BASSICK COMPANY, Bridgeport 2, Conn. Division of Stewart-Warner Corp. *In Canada:* Bassick Division, Stewart-Warner-Alemite Corp., Ltd., Belleville, Ont.

*According to cost analysts, materials-handling (about 30% of total cost) affords about the only real opportunities for cost reduction today.

Bassick *Making more kinds of Casters . . . Making Casters do more*

SEE OUR CATALOG IN SWEET'S

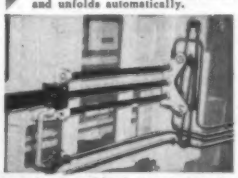


CHIKSAN

Hydraulic Swivel Joints help to simplify design

Hydraulic line fully extended, with turning movement taking place with CHIKSAN Swivel Joints.

As the Unpacker Head travels back and forth, the hydraulic line folds and unfolds automatically.



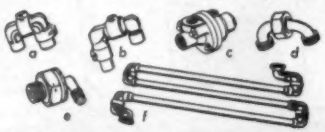
At the end of the stroke, the hydraulic line requires sharp bends which are possible only by using CHIKSAN Swivel Joints.

With CHIKSAN Hydraulic Swivel Joints you can design and build flexible hydraulic lines to handle pressures to 3,000 psi . . . and thereby gain advantages not obtainable by any other method. A typical example is the *Ermold Automatic Case Unpacker.*

CHIKSAN Hydraulic Swivel Joints make possible sharp bends, thus permitting installations where space is limited. They eliminate drag and snag. In addition, you get uniform low operating torque, strength and safety under all conditions. All-metal tubing assures longer life.

There are 5 Basic Types of CHIKSAN Swivel Joints – a Type for every purpose. CHIKSAN Engineers will gladly cooperate with you in selecting the correct Type . . . either standard or of special design . . . for your specific requirements.

(a) Basic Type Swivel Joints – for pressures from 125 psi. to 15,000 psi. (b) High Temperature Swivel Joints for temperatures to 500° F., working pressures to 700 psi. (c) Rotating Joints for 150-lb. steam, brine, etc. For hot and cold rolls, tumblers, platens, etc. (d) Sanitary Swivel Joints for food processing, fruit juices, dairies, etc. (e) Hydraulic Swivel Joints for pressures to 3,000 psi. For aircraft, industrial and armored equipment. (f) Flexible Lines, designed and fabricated to meet specific requirements.



WRITE FOR CATALOG NO. 50-AH

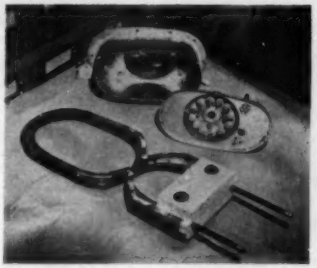
Representatives in Principal Cities

CHIKSAN TRADE MARK REG.

CHIKSAN COMPANY AND SUBSIDIARY COMPANIES
NEWARK 2, N. J. BREA, CALIFORNIA CHICAGO 3, ILL.
CHIKSAN EXPORT COMPANY, 155 WASHINGTON ST., NEWARK, N. J.
WELL EQUIPMENT MFG. CORP., HOUSTON 1, TEXAS

BALL-BEARING SWIVEL JOINTS FOR ALL PURPOSES

operation at the factory where electronic induction soldering equipment is available. However, any repairs or calibration of the parts in the field requires that the can be unsoldered. Electronic induction heating equipment could be used, but the small number of repairs necessary at each airport service station does not justify the initial cost of the electronic equipment.



Device serves useful purpose opening hermetically-sealed instrument cases

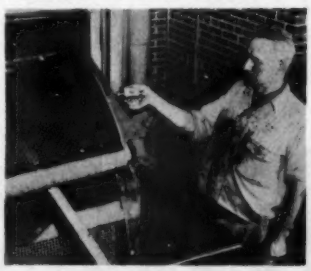
The problem was solved by bending a Calrod heater to follow the shape of an instrument container and constructing a convenient frame about the heater which reflected additional heat to the desired area. The unsoldering operation is now accomplished by the uniform application of heat around the seam.

Intake Water Screen Attachment

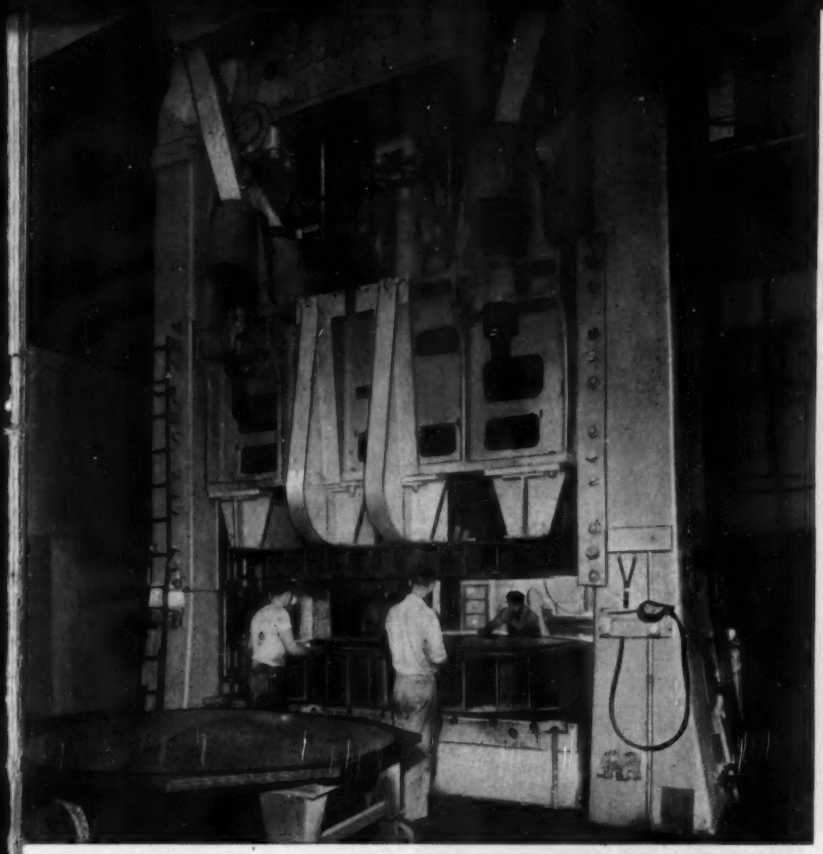
Contributed by
Metropolitan Edison Co.

As ORIGINALLY supplied by the manufacturer, the intake water screens were attached to chains by means of straps and pins. Because of an improved method of attaching the screens to the chains, it would have been necessary to replace the chains. The screens were adaptable to the change but the chains were not.

An attachment suggested by D. S. Espenshade, maintenance foreman at the Crawford Station, permitted the company's present chains to be adapted to the improved method of fastening. It not only reduces repair time but as a result has saved the price of four new chains.



Attachment suggested for intake water screens reduces repair time and eliminates the need of chain replacement



What's YOUR problem?

Meet C. K. Olsen, lubrication specialist in Standard Oil's Minneapolis office.

Consulted by the Brown Steel Tank Company, he recommended STANOIL Industrial Oil as the answer to their needs. As a result, he helped the company realize significant savings in operating costs.

Standard Oil lubrication specialists are located throughout the Midwest. Just phone or address a card to the nearest Standard Oil Company (Indiana) office for the services of the specially trained lubrication specialist near your plant.

With his help, find out how many different oils in your plant can be replaced by STANOIL Industrial Oil on such applications as:

Air compressors . . . no sticking or clogging of valves, less oil consumption in splash or circulating systems.

Speed reducers . . . less wear of gears and bearings during frequent cold starts or prolonged high-temperature operation.

Steam turbines . . . freedom from emulsions and sludge, fewer oil changes necessary.

Ring-oiled bearings . . . rings function immediately on starting, less bearing wear.

Circulating and bath systems . . . one oil for a wide variety of jobs.

Answer to a "Pressing" need . . .

TROUBLE-FREE hydraulic operation of a new toggle press was particularly important to the Brown Steel Tank Company of Minneapolis. Such operation would keep costly inspections of the hydraulic unit at a minimum—production at a maximum.

A Standard Oil lubrication specialist was called in. He recommended STANOIL Industrial Oil for this vital hydraulic job. During three years of hard, continuous service (hydraulic unit operates 2000 P.S.I. maximum), STANOIL has stayed on the job and has permitted efficient hydraulic operation. It has not been necessary to inspect the hydraulic unit in all of this time. A recent sample test showed the hydraulic oil to be in excellent condition.

STANOIL will give long oil life and trouble-free service in a wide variety of equipment: speed reducers, head stock gears, auxiliary turbines, compressors, as well as hydraulic systems. STANOIL is fortified to combat rust and corrosion.

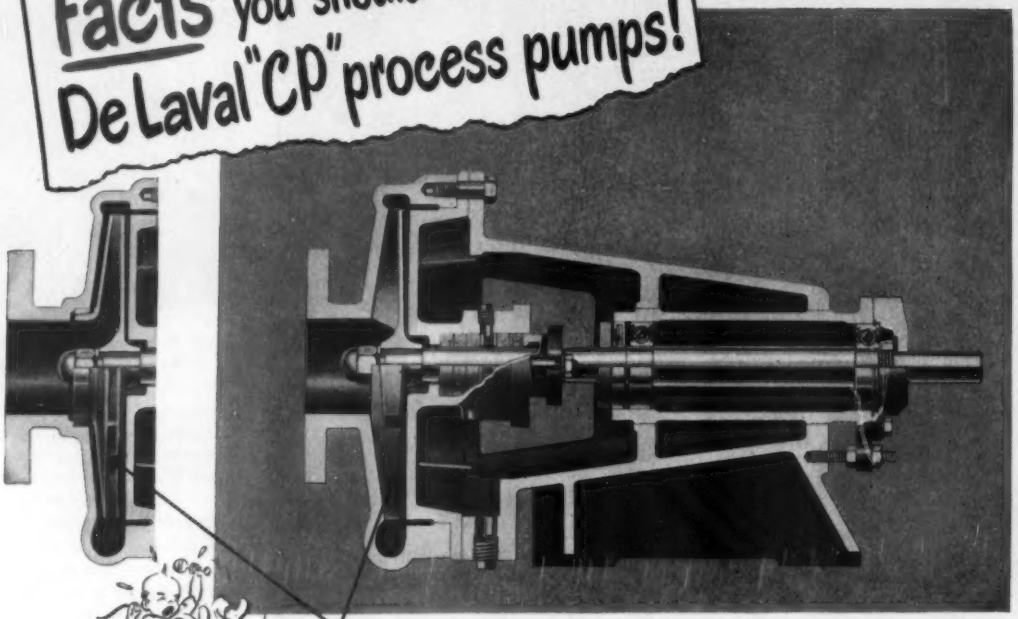
STANOIL
TRADE MARK
Industrial Oil

Your nearby Standard Oil lubrication specialist is ready to explain how your plant may obtain maximum benefits from STANOIL and other high-quality petroleum products.

Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, for his prompt attention.

STANDARD OIL COMPANY (INDIANA) STANDARD

Facts you should know about De Laval "CP" process pumps!



When service requirements change, you don't have to buy a whole new pump!

The De Laval CP pump can be quickly converted from closed to open impeller (or vice versa) by changing the pump volute and impeller only. This standardization also means you can keep your stock of spare parts to a minimum. Three sizes of shafts, shaft lock-nuts, bearings, bearing cartridges and pedestals *fit all nine sizes of De Laval CP pumps.*

Shims and fussy fits are old fashioned...

When you have to compensate for wear between the impeller and case, it is only necessary to face off these parts, reassemble the pump and position the impeller with the external adjusting screw provided for that purpose. No shims required—no fussy fits.

Did you also know?...

that the external adjusting screw can be used to pull the impeller off the shaft? It is quick, easy and requires no special tools.

DE LAVAL STEAM TURBINE CO., TRENTON 2, N. J.

TURBINES • HELICAL GEARS • CENTRIFUGAL BLOWERS AND COMPRESSORS
CENTRIFUGAL PUMPS • WORM GEAR SPEED REDUCERS • IMO OIL PUMPS

50th DE LAVAL Anniversary

CPP-5

TESTING TIPS

PUZZLED BY POLYPHASES?

Here's an easy way to save time in determining the sequence of polyphase circuits. Let General Electric's handy phase-sequence indicator do it for you. For example, this compact little instrument shows you the proper connections for meters, instruments, and relays, as well as those for paralleling generators, transformer banks and power buses. You can quickly predetermine the direction of rotation of polyphase motors.

Operation is easy. Simply connect the three leads across the three phases. One lamp will glow, showing you the direction of phase sequence.

There are no moving parts, bearings or pivots to get out of order. Will not burn out at accidental overvoltage. Get more facts on this valuable time saver in bulletin GEC-374.

VOLTAGE SURVEYS CAN SAVE EQUIPMENT

Bad voltage can do strange things to plant equipment. For instance, if voltage is 10% low, lamps produce only 70% rated light. If voltage is 10% high, lamps will last only 29% of rated life. Generally, what is true of lighting applies to motors, heaters, and other electrical production tools. Usually the cause of the trouble is overloaded or underloaded distribution circuits, and you can correct many such difficulties by balancing the system. Of course, the first step is to accurately determine circuit voltage conditions.

You can get accurate records over an extended period of time with General Electric's type CF inkless recorder. It's designed for dependability and maximum convenience—runs as long as 30 days without attention, and can be used outdoors. You put it on the line; it comes up with a record on paper of circuit voltage conditions—just the information you need to appraise your distribution system. Available in a variety of voltage ranges, the CF inkless recorder has an accuracy of $\pm 1\frac{1}{2}$ per cent of full scale value. More details in GEC-215.

IS FURNACE RESISTANCE COSTING TOO MUCH?

Many electric furnaces have a habit of changing resistance with age. The longer they operate, the more power they require for the same amount of heat. Thus, it's good practice to make periodic checks of your furnaces, especially those connected in parallel. Knowing how much each one costs to operate allows you to replace heating elements as soon as they've outlived their usefulness.

With General Electric's type AK-2 hook-on wattmeter, this testing job is easy, and there's no interruption of service. You just clip the two potential leads across the line, hook the AK-2 around one conductor, and take your reading in watts. The AK-2 measures single-phase and polyphase circuits with an accuracy of $\pm 5\%$ of full-scale value. Weighs only 4 pounds. For more details, check bulletin GEC-591.

SECTION C602-203
GENERAL ELECTRIC CO.
SCHENECTADY 5, N. Y.

Please send me information on the following products:

- ☐ Type AK-2 hook-on wattmeter . . . . . (GEC-591)
- ☐ phase-sequence indicator . . . . . (GEC-374)
- ☐ type CF inkless recorder . . . . . (GEC-215)

NAME .....

COMPANY .....

STREET .....

CITY ..... ZONE ..... STATE .....

GENERAL ELECTRIC

400° F.

350° F.

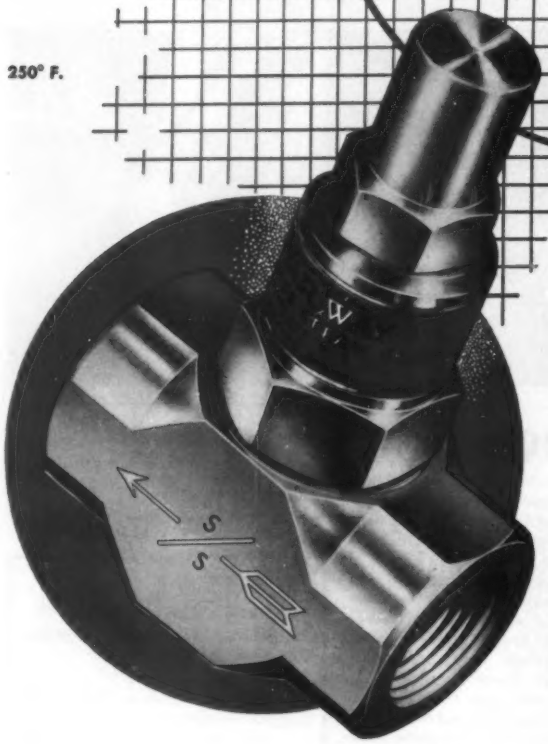
300° F.

250° F.

FOR EVEN TEMPERATURES

YARWAY

STEAM TRAPS



● Processes requiring careful temperature control call for Yarway Impulse Steam Traps on steam equipment.

The reason? . . Yarway traps maintain even temperatures because they *continually* sample and respond to a trickle of the condensate. There is no arrest in flow, no waiting for large quantities of condensate to accumulate, or trapped steam pockets to condense.

Other reasons why Yarway Impulse Traps have become first choice in many thousands of plants:

- **They get equipment hotter, sooner**
- **Small size, light weight**
- **Easy to install, easy to maintain**
- **Only one moving part**
- **Good for all pressures**
- **Stainless steel construction**
- **Low cost**

If you are not already familiar with these and other advantages of the Yarway Impulse Steam Trap, try one *for free* and find out for yourself. Call your nearby Yarway distributor, or write to:

YARNALL-WARING COMPANY

145 Mermaid Avenue • Philadelphia 18, Pa.

BRANCH OFFICES IN PRINCIPAL CITIES

Stainless Steel Body

YARWAY IMPULSE STEAM TRAP

For Industrial Lighting — Don't Overlook Color Quality

Were you disappointed because the new dynamic color scheme did not turn out like the samples? . . . Do customers in the cafeteria complain about the color of the food? . . . Do people in department X look like men from Mars? . . . Does inspection conflict with production for lack of uniform color matching? . . . If these things happen check the color ratings of your lamps . . . Lamp types like people have specific characteristics . . . Some do one job better, some another . . . Here are the fundamentals on which to build a complaint-free lighting program

By E. A. LINSDAY and J. L. TUGMAN
Engineering Division, Lamp Department
General Electric Co., Nela Park, Cleveland

THERE HAS never been a time when problems of color in industrial operations have not been growing as fast, or faster, than solutions can catch up with them. Many difficulties that keep recurring are, of course, unnecessary obstacles which arise from neglect of proper lighting.

Since the control of color problems is in most instances a matter of reliance on human eyesight, the quality and character of the lighting for the color discrimination tasks is very important. The eyes can be trained to dependable accuracy if the light supplied for the job is adequate, that is, consistently uniform in quantity and spectral values.

When illumination delivered for a task is substantially lower than the normal quantity, certain color distinctions are not apparent. Thus, where the simple problem of dirt accumulations on lighting equipment and plant surfaces depreciates the quantity of light delivered, certain elementary color problems cannot be checked accurately or dependably. Bad voltage conditions, or, the choice of lamps of the wrong voltage rating can also be a source of trouble.

Such factors as bad maintenance, either in terms of dirt depreciation or improper voltage, are so elementary it would seem no one need be reminded of them. Nevertheless, they recur so frequently that loss of efficiency from these factors should be eliminated before seeking more complex causes.

From a practical standpoint and when compared on an equal quantity basis, colors of light emitted by the common illuminants are about equally satisfactory for most seeing tasks. Mercury sources while widely used in industry are excepted since the blue green character of the mercury light restricts application to non-color critical areas. For even the simplest demands for color corrected quality mercury units are paired with filament equipment to modify the characteristic blue green light by adding the red component.

Of course some industrial inspection problems such as the visual determination of certain minute imperfections in metal parts are carried out best without any visible light. Parts are treated with chemicals which are luminescent under black (ultraviolet) light to reveal minute flaws which would otherwise be unnoticed.

Aside from all general and extra special situations, there remains a wide range of industrial color discrimination problems. Printing, textiles, paints and paper, to name some representative large industries, each have their own special problems. Each has its particular needs for color control. First, there is the objective of matching a sample, second, maintaining this objective in production and, third, repeating the color in subsequent production.

Those who have long experience in meeting these goals know that surface colors may match under one illuminant but not under another. This is due to their different spectral reflectance characteristics. Consequently, wherever colors are to be examined critically by personnel trained under a specific lighting condition, a spectral energy match is, in general, required of any illuminant intended as a substitute for another. Unless this is done any change of illuminants, used as substitutes for each other, will cause a difference in the appearances of objects seen under them.

Table I. How 2500 people rated several light sources when viewing different materials as reported in a development study by G. B. Buck. In the table, 1 indicates the most desirable or first choice and 6 is the least desirable light source

MATERIAL VIEWED	TYPE OF LAMP USED					
	3000K Pila.	Soft White	Warm Tint	3500K White	4500K White	6500K Daylight
Red Cardboard	2	1	5	4	3	6
Yellow Cardboard	2	3	1	2	4	5
Green Cardboard	1	6	2	3	4	5
Blue Cardboard	5	3	6	4	2	1
White Cardboard	5	4	4	2	1	3
Brown Cardboard	1	4	3	2	1	5
Multicolored Cloth	4	1	5	3	2	1
Blonde Complexion	2	1	4	3	5	6
Hair	1	1	2	2	3	4
Brunette Complexion	2	1	5	3	4	6
Hair	2	1	6	4	3	5
Titian Complexion	1	1	4	2	3	5
Hair	1	2	4	3	3	5
Milk	1	3	4	2	3	3
Coffee with Cream	1	2	5	3	4	5
White Bread	2	1	5	3	3	4
Brown Bread	1	1	4	2	3	5
Butter	1	2	3	3	4	5
Cooked Meat	2	1	4	3	4	5
Lettuce	1	1	2	1	2	2
Green Pepper	1	1	2	1	2	2
Tomato	1	2	5	3	4	6
Food Display*	2	1	5	3	4	6

*Viewing all foods listed above as an ensemble.

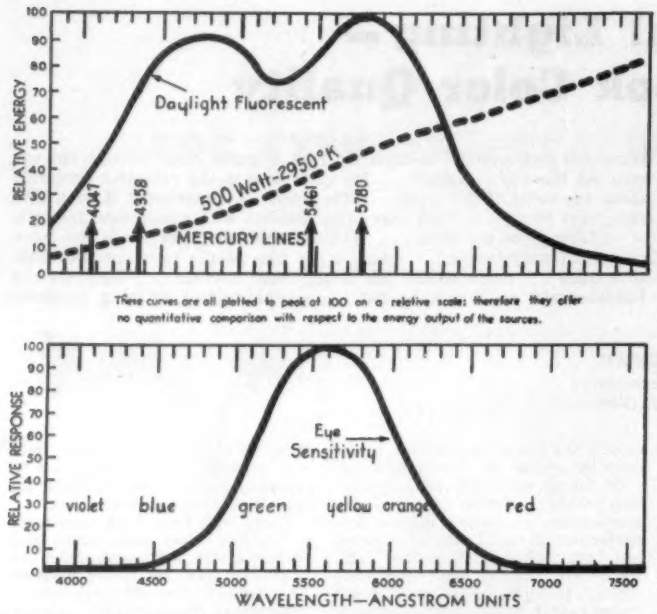


Fig. 1. Characteristics of two common lamps, with contrasting energy distribution, in relation to eye sensitivity. Charts cover only the visible light spectrum; off the chart to the left is the ultra-violet and to the right the infra-red regions

Spectral energy measurements are made on a spectroradiometer. Relative energy at each wavelength can be determined and a curve plotted for each type of lamp. Curves for two types of lamps are shown by Fig. 1. A smooth curve such as given for a filament lamp, indicates radiation at all wavelengths.

Electric discharge lamps, such as mercury, radiate principally at a few specific points represented by the vertical arrows on the chart. The intensity or amount of energy of the various lines will vary with the design of the lamp particularly with respect to the vapor pressure at which the lamp is operated.

Extremely low vapor pressure (1/100,000 of an atmosphere) in fluorescent and germicidal lamps tends to concentrate the mercury radiation at the single 2537 Angstrom[1] line, which is beyond the scale of Fig. 1 in the ultraviolet range. Phosphor coatings inside fluorescent lamps convert this 2537A radiation into longer wavelengths of visible light.

Filament lamps produce relatively little ultra-violet, and as indicated by the curve, most of the energy is in the longer wavelengths of visible and infrared. The higher the filament temperature[2], the more efficiently light is produced, and, the light becomes whiter as more radiation is shifted to the shorter visible wavelengths. Conversely, as the temperature is decreased, less light is produced and the radiation peak is at longer wavelengths in the infrared region.

The eye sensitivity curve, Fig. 1 represents the average of a great many eyes tested, for individual eyes differ in their sensitivity. The eye sensitivity curve has been internationally standardized and is used as the basis for measuring the light output of lamps. The lumen output of a source can be computed by multiplying the radiant energy at each wavelength by the eye sensitivity at that wavelength and adding up the products.

With reference to everyday industrial problems and considering data available at present, it would seem that no one source is completely satisfactory for critical color matching. For example, conditions are found where two colors will match under some particular illuminant and will not match under some other type. This is as true for natural daylight as it is for other sources.

For the most critical type of color matching, we have found it desirable to check for color match under two types of sources. If the proper color match is obtained under two sources which vary widely in their spectral characteristics, then the match will be perfect under any other lighting condition.

One of the two sources used should be predominantly blue in its spectral characteristics, whereas the other should be predominantly red. There are a few materials which fluoresce or produce visible light when illuminated by ultraviolet radiation. For this reason, the source which is predominantly blue should also contain enough ultraviolet radiation so that these fluorescent effects can be produced. The source which is predominantly red should not contain ultraviolet.

Inasmuch as natural daylight varies over an extremely wide range in color temperature and intensity, a controlled artificial source is much to be desired over a natural daylight. One desirable technique is to do the color matching work under daylight fluorescent lamps and then check the results obtained by comparison under filament lamps.

Table II. Relating development to demand, GE has simplified its line of white fluorescent lamps to the four listed below which cover all common lighting requirements. Colored lamps are available for special conditions or circumstances

1. **STANDARD COOL WHITE** — Formerly known as the 4500K White. It combines high light efficiency with a cool atmosphere. This combination has made it popular for high-level illumination of 50-100 foot candles or more. It is widely preferred for working and selling environments such as offices, factories, many stores and schools.

2. **DE LUXE COOL WHITE**—This is a new lamp with no previous designation. It is a companion to No. 1, the Standard Cool White. It has far superior color rendition with good (but not the highest) light efficiency and is first choice wherever the optimum over-all color-rendition rates top importance.

3. **STANDARD WARM WHITE** — Formerly known as Warm Tint. It combines high light efficiency, in fact the highest efficiency in white lamps, with the color impression of filament lighting. It is especially useful for minimizing the color contrast between light sources in combination fluorescent-filament lighting systems.

4. **DE LUXE WARM WHITE** — This is a new lamp with no previous designation. It is a companion to the No. 3, the Standard Warm White. It has fine color rendition with good (but not highest) light efficiency and is particularly desirable where a warm environment with good color rendition is preferred.

Nos. 1 and 2 are the "whitest" G-E fluorescent lamps. Both help create a cool atmosphere, fresh and modern. White surfaces illuminated by them look alike and lighted, the lamps also look alike except for brightness. When used in the same installation they appear similar.

Nos. 3 and 4 each combine the color impression of traditional filament lighting with modern appearance. White surfaces illuminated by them look alike and lighted, the lamps also look alike except for brightness. When used in the same installation, they appear similar.

Use of fluorescent lamps for color matching has stirred up considerable controversy in the color matching field. Most of the specialists in color work are quite temperamental and have many preconceived convictions as to the ideal light sources for color matching. The fluorescent lamp has not been accepted by some of the colorists because of the mercury line radiation which is superimposed on the continuous spectrum. However, our tests indicate that the amount of line radiation from fluorescent lamps has no practical significance insofar as color matching work is concerned.

If it is not feasible to use two sources for some particular color matching job, the best single source available today is probably the de luxe cool white fluorescent lamp for this lamp has most nearly equal amounts of energy in all the portions of the spectrum. This means that all colors are treated fairly without undue emphasis on any one portion of the spectrum.

If the color matching is confined to a particular color, for example blue denim textiles, the best single course under these conditions is one that is essentially complementary in color to that of the product. For the blue denim, the incandescent lamp would allow the color matcher to see more differences in color than with other types of illuminants.

For color discrimination work where the grader carries the standard in his head, so to speak, it is then important that the illuminant match as closely as possible the source which the grader was trained, and is used to working, under. This is the condition under which the samples, which he is remembering as standard, were illuminated. If it is possible to train the grader, the best source is the de luxe cool white fluorescent lamp.

There are many other things to be considered in lighting for color matching besides the color of the light source. Illumination levels of from 200 to 400 foot-candles are desirable for most types of color matching. When dealing with extremely dark cloors, lighting levels up to 1000 footcandles are desirable. The geometry of the installation is also important, particularly when dealing with colored products which have shiny or glossy surfaces.

Color Matching

For most types of color matching, sources relatively large in area and uniform in brightness are highly desirable. This is particularly true for products which are three dimensional in nature, so that it is impossible to position them in such a manner that the surface on some part of the product will not reflect an image of the light source. This reflected image should be as low in brightness and as uniform in brightness as possible in order that it will not mask the underlying color of the finish on the product.

The ideal condition is to have the product positioned in such a way that the specular reflection on its surface will be from an area which is essentially black so that the operator can observe only the true color of the underlying pigment. It is also important that all extraneous light be eliminated from the color matching area. All the portions of the booth interior must be finished in neutral tones.

One of the most critical color problems is in connection with the inspection of color proof in the engraving industry. Most four-color process work uses inks ordinarily designated as yellow, red, blue and black. The red is actually a magenta, reflecting red and blue and a little green light.

Fig. 2. Inspection booth, designed by E. A. Linsday for use with four-color process work, using colored lamps equipped with gelatin filters. Color proofs inspected, with different lights in accordance with the legend in the booth, appear in black

FOR SPECIAL PROBLEMS

This article covers the fundamentals of good industrial lighting from a practical standpoint. Those interested in the more technical aspects, or, concerned with special color problems are referred to the following engineering papers.

1. Colored Lighting for Color Printing, two papers presented by R. E. Farnum and E. A. Linsday before the American Photoengravers Association. They deal with the use of fluorescent lamps for making color separation plates and inspecting the proofs: Covers use and characteristics of colored lamp and filters.

2. Color Preference Studies with Fluorescent Lamps by G. E. Buck II presented before the Illuminating Engineering Society. Covers laboratory studies, emission characteristics and reflectance characteristics for many lamps and many materials. (Supply limited).

Readers interested in these reprints should write direct to the co-author of this article: Mr. J. L. Tugman, Engineering Div., Lamp Dept., General Electric Co., Nela Park, Cleveland 12, Ohio.

The yellow reflects red and green light and very little blue. The process blue, actually cyan, reflects both blue and green and a little red. Ideally the red should reflect everything but green, the yellow everything but blue and the blue everything but red. The yellow comes nearest this ideal.

The actual overlap of the colors reflected from the inks used for process printing was a basic problem in working out a specific inspection method. The inspection booth shown in Fig. 2 was designed to simplify the work and develop greater accuracy. Two banks of fluorescent lamps are employed.

Besides white lamps (4500K), red, yellow, blue and green lamps are used. Theatrical gelatins of the colors corresponding to the color lamps are wrapped around them to function as filters and provide the color saturation needed to produce the sharp results desired. Color inspected under the complementary illumination, as directed by the legend in the inspection booth, appears black.

[1]Angstrom unit is a measurement of length commonly used for expressing wavelength of light and other very short lengths. It is 0.000,000,1 mm. In the visible light spectrum, micron is sometimes used for convenience. A micron is 0.001mm and therefore 10,000 A. For comparison an inch is 25.4 mm, 25,400 microns or 254,000,000 A.

[2]Usually indicated as degrees K or Kelvin, a temperature scale still used to a considerable extent in scientific work. It was developed by Lord Kelvin as an ideal temperature scale and formed the basis of the international Centigrade scale adopted in 1927. For all practical purposes a degree Kelvin is equal to a degree Centigrade but the K scale begins at absolute zero instead of at the freezing point of water. For conversion purposes, therefore, degrees K equal degrees C plus 273.16.

Heavy Fuel Oil—
Piping, Storage and Handling

Relationship between delivery quantities and storage facilities . . . Location of storage tanks—indoors or outdoors? . . . Pipe sizing and valving of system . . . Protecting tanks against corrosion . . . Installation of storage tank . . . Insulation of piping runs . . . Instruments and accessories . . . Necessity for close regulation of oil temperatures . . . Methods of heating: electrical or steam . . . Design and operation of fuel oil preheaters . . . Typical oil piping diagrams

By WILLIAM W. GAYLORD, Consulting Engineer, Torrington, Conn.

THE PROPER STORAGE and handling of the fuel oil is necessary for the successful operation of any oil fired boiler plant. The first thing to consider is the amount of oil that it will be necessary or desirable to store. This will depend first on the size of the plant; second, on the method of delivery and the size of lots in which the oil is delivered; third, on number of days reserve supply necessary or desirable; and fourth, on the size of tank or tanks that can be placed in the space available.

For example, take a plant consisting of two boilers with capacities of 12,000 lb of steam per hour each as the basic plant. These boilers would not be expected to use over 2,500 gal of oil per day and the average use would be considerably less. Assume oil is to be delivered to this plant in tank trucks of 4,500 gal capacity by a supplier who has an adequate bulk storage plant within ten miles of boiler plant. Here it would not be necessary to carry over seven days reserve supply so a single tank of 25,000 gal capacity is satisfactory.

If, instead of being located near a bulk storage oil plant, the boiler plant were at such a distance that the oil would be delivered by rail in tank cars a larger reserve supply would be preferable. As the capacity of a standard tank car is 10,000 gal, and a ten days reserve supply is desired, this would require a storage of at least 35,000 gal. As a 25,000 gal tank is the largest that can be handled in one piece two smaller tanks would be advisable.

Where there is space available within 100 ft of the boilers, outside underground tanks are best. Tanks of this type must, of course, be built to the Underwriters' Standard Specifications for underground service and bear their label of approval for such service.

Where no space is available for outside underground tanks they may, in some cases, be buried under the boiler room floor. Tanks can be placed above ground only when special approval has been secured from the Underwriters and their safety precautions complied with. In many cases State or Municipal Codes also cover the installation of fuel oil storage tanks and must be followed where they are more restrictive than the Underwriters' requirements.

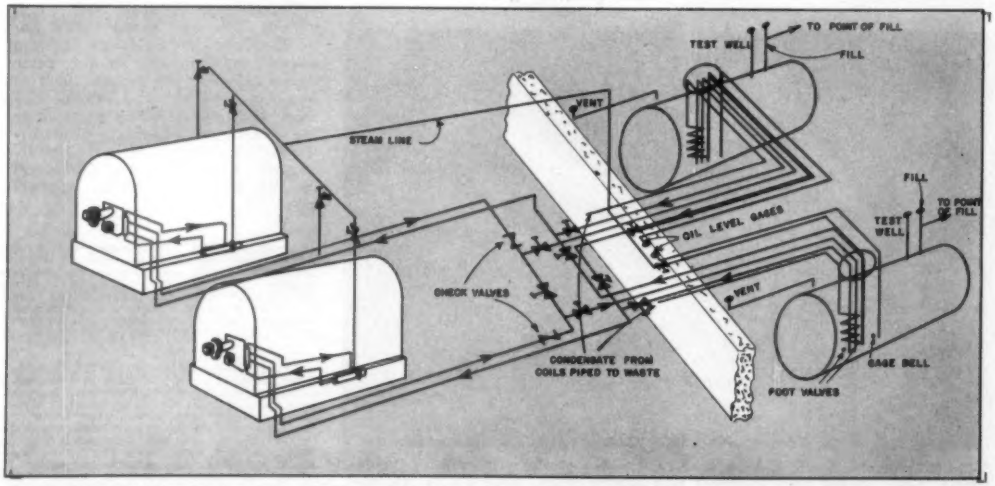


Fig. 1. Oil piping diagram for a plant having two boilers and two storage tanks. Either boiler is supplied from either tank

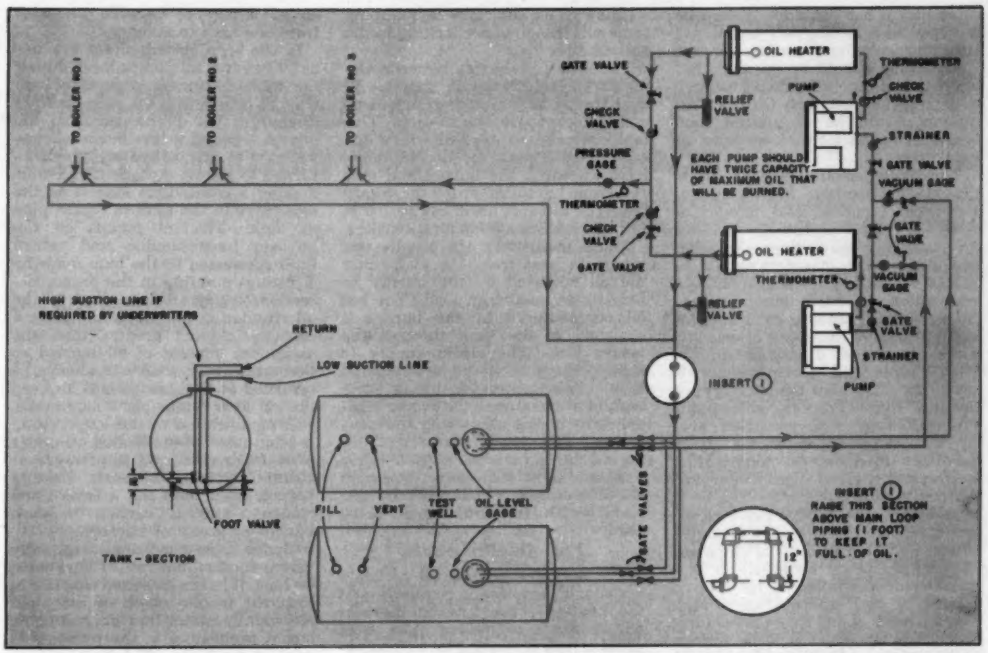


Fig. 2. A loop system for supplying a plant having three boilers and two tanks, of advantage where lift is more than 12 ft

The system for handling the fuel oil into storage tanks and from tanks to burners or fuel oil pumps in boiler room, and the piping necessary for this purpose, must be properly designed and carefully installed if satisfactory results are to be expected.

Where oil deliveries are to be made by tank truck and the oil can be discharged from the truck directly into the tank or through a fill pipe of ample size, 25 ft or less in length no special provision for unloading the oil is necessary even in the heaviest grades. Where the oil is delivered in tank cars provision must be made for heating the oil in the tank car before it will flow to the oil storage tank.

This is usually done by running a steam pipe adjacent to the fill pipe and providing for a flexible hose connection from steam pipe to heating coil in tank car. If a long fill pipe from car to tank is necessary the fill pipe and steam pipe should be wrapped in a common insulation covering.

Steam line for heating oil in the tank car should have a shut-off valve inside the boiler room. Provision also should be made for completely draining line from boiler room to unloading point, when not in use, to prevent possible freezing.

Underground tanks should have their outside surfaces well protected against corrosion by treatment with a proper corrosion prevention coating. Where the ground in which they are buried is clay, sand, or sand and gravel no other protection is necessary but if they are to be buried in filled ground that contains any coal ashes or cinders the excavation should be made enough larger so that a filling of clay or mixed sand and clay at least 2 ft thick can be placed between tank and filled ground.

Top of tank should normally be at least 2 ft below the surface of the ground but this may be reduced to a minimum of 15 in. if a reinforced concrete slab 12 in. thick and 1 ft larger than the tank in each dimension is placed over tank. If the ground in which the tank is buried is liable to be flooded the tank must be properly anchored down to prevent its floating when empty. This can be done by placing a reinforced concrete slab of sufficient size and weight below the tank and anchoring the tank to it by straps or rods run over top of tank and anchored into concrete slab. Or it can be done by placing a reinforced concrete slab of sufficient size and weight over tank.

All oil suction and return connections, and steam and return connection to tank heating coil, should be made through and welded to oil tank manhole cover. A brick or concrete manhole of sufficient size to allow access to pipe connections to the tank should be placed over the tank manhole. A reinforced concrete slab containing a cast iron manhole frame and cover should be placed directly over the tank manhole. It should be large enough so that the tank manhole cover, together with steam coil, oil suction and return stubs, can be drawn out through it. Tank fill, vent, gauge and test well connections should not be made through manhole cover.

Pipe Sizes

The sizes of all piping runs for fuel oil are very important especially where heavy oil is used. The suction lines for burners up to 60 gph capacity using No. 6 oil should be 2 in. dia for lines up to 100 ft in length; and for burners of 75 to 200 gph capacity, 2¼ in. dia for lines up to 100 ft in length. If lines must be longer they should be one size larger. Return lines can usually be made one size smaller than suction lines. Oil piping should be as short and direct as possible, using the least practicable number of bends and fittings.

Inside the building the piping must be protected from mechanical injury, usually by running in trenches under the floor. Where it is run underground outside it must be properly insulated.

It is good practice to group oil suction and return pipes and steam supply and return pipes to tank heating coil as closely as possible in one trench, wrapping them in a common mineral wool blanket in-

sulation. This should then be wrapped in a roofing felt jacket and all joints sealed with roofing cement.

All piping should be standard full weight steel pipe with heavy pattern malleable or cast iron fittings. All unions should be of ground joint type and valves for oil lines must be gate valves.

The piping should be laid out to provide connections for all necessary thermometers and gauges as well as the necessary priming and sampling connections. Suitable, easily cleanable, strainers should be placed in suction lines near suction connection to each pump and/or burner pump. Gauges should be installed to show pressure or vacuum on suction and discharge side of each pump and thermometers in order to show oil temperature on suction connection to each pump and discharge side of steam preheater. Where possible a thermometer to show oil temperature between the electric preheater and burner is desirable.

All pipes should have sharp clean-cut threads and the ends thoroughly reamed and blown clear of chips and dirt before being installed. A pipe joint cement unaffected by fuel oil should be used and applied to male threads only, using care that none of it gets on inside of pipe or fittings. All joints should be made up with care and the entire system tested for leaks under an air pressure of 50 psi. To be satisfactory there should be no measurable drop in the pressure in the system for an hour after air supply is shut off.

When burning any of the heavier oils close temperature regulation of the oil reaching the burner is essential to reliable operation and maximum burner efficiency. In these systems it is usual practice to heat the oil in two or three stages. It must be heated sufficiently in the storage tank so that it can be pumped easily. A heating coil is usually installed around the lower end of the suction stub to do this. The heat may be supplied by steam, where there is sufficient pressure to force the condensate out of the coil, or in low pressure systems by hot water from a heat exchanger forced through the tank coil by a circulator.

It is also usual practice to heat more oil in the preheater between the pump and burner than is delivered to the burner. Therefore, considerable hot oil is returned to the storage tank through the oil return; usually enough is returned to keep the oil in the tank warm enough to be pumped satisfactorily. Where this is the case and it is necessary to use the tank coil only under unusual or extreme conditions it is common practice to control the heat supply to the coil by a hand operated valve. However, where the coil is used all of the time some type of automatic temperature control is desirable, as over-heating the oil may cause difficulty in pumping some oils due to vapor locking in the suction line.

The steam preheater between the oil pump and burner is intended to heat the oil to the temperature necessary for proper atomization. This temperature varies both with the type of oil and the method of atomizing the oil in the burner and may run from 120 to 160 F. for the rotary cup type burners up to 240 to 280 F. for the pressure atomizing burners.

These preheaters are usually designed to heat from 1½ to 2 times the oil required by the burner or burners at maximum load. The hot oil not required by the burner is returned to the tank through the return line. The steam supply to these preheaters should be controlled by a reliable automatic temperature regulator to maintain the proper temperature in the oil having the preheater. This temperature regulator should be adjustable over a fairly wide range so that it can maintain the temperature which gives the best results with the particular oil being used.

Fuel Oil Preheaters

The operation of fuel oil preheaters should be checked regularly and the heaters cleaned when there is any evidence of fouling. The most usual causes of fouling by carbonization are heating the oil beyond the normal range and the failure of the temperature controller to stop the flow of steam through the heater when oil flow stops. The heaters should be so constructed and so installed for easy cleaning. Cleaning may be accomplished by removing heating coil and cleaning it mechanically or by disconnecting heater and circulating a cleaning emulsion by a special circulating pump.

The condensate from all tank heating coils and oil preheaters should be piped to waste rather than returned to the boiler; a crack or leak in the heating coil might cause fuel oil to be returned to the boiler with disastrous results.

Figure 1 shows a piping diagram of a typical plant having two boilers and two storage tanks. The piping is so arranged that either or both boilers can be supplied from either tank or that both boilers can be supplied from their individual tanks. If only one tank were to be used to supply both boilers, the piping could be considerably simplified as no cross-over piping (or valves to control it) would be required.

A loop system of supplying oil to two or more boilers is sometimes less costly to install than separate suction lines from boilers to tank or tanks. Figure 2 shows a piping diagram for such a system using three boilers and two tanks. The loop system is advantageous where the oil lift from the bottom of the tank to burner or oil pump is more than 12 ft, or where two or more tanks are required and it would be an advantage to be able to pump from one tank to another.

In the loop system there are usually two fuel oil pumps located near the fuel oil storage with a fuel oil heater connected to each pump's discharge. Oil discharged from the pumps is piped to the burners' connections at the boilers and then returned to the oil storage tanks, thus making a continuous loop from the foot valve in the tank to return pipe in tank. The oil pumps on the burners have suction and return lines connected to the loop main by Y fittings pointing in the proper direction to give oil flow. Each of the oil circulating pumps should have a capacity enough greater than the maximum amount of oil burned so that sufficient hot oil will always be returned to the storage tank to keep the oil at a pumpable temperature.

A modification of the loop system is often used where heated oil under pressure is delivered to pressure or steam atomizing burners. Here a branch from both the pressure and return mains is carried to each burner or group of burners.

Under some conditions, especially where suction and return lines must be long, it has been sound practice to heat the whole length of the pipes electrically rather than depending on steam preheaters at the pumps and coils in the tanks. This can be done in two ways, first by making the pipe itself the heating element by placing insulating joints in the suction and return lines near the pumps and passing a large current at low voltage through the circuit from pumps to tank and return and second by winding the pipe lines with a special heating wire before insulation is applied. In either case an electrically operated temperature controller can be applied to regulate the current so as to maintain the desired temperature.

To guard against sludge deposits in fuel tank and piping system it is usually advisable to use one of the reliable sludge solvents now commercially available and treat all oil with it as received.

A TIME STUDY of all jobs in warehousing and moving petroleum products to the consumer can give a big boost to the efficiency of a distribution system. The purpose of the study, conducted at 10 bulk plants in Ohio, was to raise efficiency in distribution by using the same engineering principles that have made the industry so efficient.

The survey consisted of running time studies on all jobs involved in receiving, handling, storing and delivering all types of oil products. The committee set up a series of forms on which plant personnel showed exactly how much of each day should be charged to each product that passed through the plant.

PERMANENT MAGNETS— Many Kinds for Many Jobs

Effect of magnetic separator protection on insurance rates, safety, customer relations . . . Losses in machinery damage and downtime due to tramp iron . . . Factors which make an engineered job necessary . . . Various types of magnetic protection available . . . Typical applications

By Arlo Israelson, Chief Engineer Eriez Manufacturing Co.

NOT so long ago the manager of a large grain mill said, "I wish there was some way to remove wires and nails from the grain brought into the mill for grinding.

"Last year we had a serious fire when a stray bolt from a harvester entered the machinery, hit a spinning hammer and struck a spark. Tramp iron is always breaking the screens in the grinder, too. And even worse was the death of the company's prize cow. The vet found eleven nails and thirteen pieces of baling wire in her stomach . . . from our own feed."

The sales engineer who sold the miller his grinder thought a great deal about this problem. He knew that some plants used long cobalt steel horseshoe magnets to help remove tramp iron, but that they were not too strong and soon lost their magnetism. Others used electric magnets, but they were very expensive and not 100 per cent dependable.

Then one day he read about Alnico, a powerful new magnetic alloy. He got some and built an Alnico-powered magnetic separator. The miller installed it so that all grain going into his grinder passed across the flat face of the magnet.

In the first week the new magnet caught two handfuls of nails, wire, nuts, bolts and even a jackknife. The miller collected the daily catch and proudly showed his customers the iron he was taking from their grain. He showed his fire insurance company, too, and got a reduction in premium rates.

Most plant fire and explosion codes emphasize that all sources of ignition must be eliminated from inside machinery and from the area immediately adjacent to operating equipment. In accordance with this principle, insurance companies and fire prevention bureaus recommend that permanent magnets be installed at strategic points to prevent fires and explosions caused by sparking tramp iron. Some of the danger points emphasized are pulverizing mills, cutters and grinders, air lines leading to garnetts and opening room machinery, hammer-mills and attrition mills.

Insurance companies have paid thousands of dollars in injury claims as a result of iron and steel trash in food products. Food processors themselves spend millions to settle, out of court, cases involving personal injury caused by nails, wire, needles, bolts, hairpins and other tramp metal, in canned goods, cereals, candy, chewing gum, peanuts, tobacco and similar products.

The losses here are not only measured in dollars. Good will and consumer acceptance of product are particularly violable.

Animal attrition due to tramp metal is high, too. Veterinarians and slaughter houses report tramp metal in the stomachs of 80 per cent of slaughtered cattle. Recently, 5,000 head of cattle were reported killed because of irritation and subsequent pericarditis induced by picking up sharp metal objects in feeds. In the same year nearly 700,000 livers were condemned for abscess. This alone constituted a loss of approximately $2,000,000.

Machinery Damage

Perhaps the most common effect of tramp iron inclusions is damage to machinery. Every year millions of dollars are lost in repair and downtime because a pair of pliers gets into a colliery crusher, a baling clip into a garnett machine, a bolt into a valuable screen, or any tramp iron into almost any machinery.

The Buffalo Pottery Company, Buffalo, N. Y., found downtime and pump damage caused by bolts and nails in their enamel slip created a "production emergency."

Aralac, Inc., Taftville, Conn., a division of the National Dairy Products Corporation, had a bolt drop into a garnett machine. It "tore the pickers all to pieces," and cost the company a great deal of money.

Bison Castings, Inc., Buffalo, N. Y., had a "great deal of trouble with small pieces of iron" that remained in the sand after mold shakeout and frequently damaged the sand conditioning machine.

The Upholstery Supply Co., San Francisco, calculated that tramp iron damage to garnett machine feeders cost about $5,000 annually . . . not counting downtime.

In theory the remedy for all this is relatively simple: tramp iron causes trouble; magnet catches tramp iron; install magnet and eliminate trouble.

In practice, however, the solution can be complicated by many conditions that affect the efficiency with which ferrous contamination can be removed from materials. For example, an Alnico magnet installed 1 in. above a belt conveyor carrying lima beans at a speed of 100 fpm will probably never permit a particle of iron to pass. Speed up the belt to 200 fpm and the strength of the particular magnet in use might not be great enough to insure complete purity of product.

Other factors such as depth, consistency and size of material being cleaned, dimensions of the iron to be separated, ambient temperature, adjacence of other magnetic elements, etc., all form part of the equation used to determine peak separating efficiency.

Plate Magnets

The most common non-electric industrial magnetic separator, originally developed by the Eriez Mfg. Co., Erie, Pa., consists of a series of Alnico magnet castings mounted on alloy steel plates. These are surrounded by a strip of stainless steel or aluminum which constricts the magnetic forces to the working surface. As a rule this plate type separator is hinged so that it can be swung easily from its working position for removal of accumulated iron.

Plate magnets vary in capacity and engineering characteristics like electric motors. Unlike motors, however, they are not purchased satisfactorily on an off-the-shelf basis. This is true because there are so many variables in an installation that efficiency is not likely to be maximum without consideration of specific conditions. Responsible companies specializing in this equipment sell only through engineering-trained representatives.

Plate magnets are usually installed

Photo: Erie Mfg. Co.

Application of magnetized pulleys for the separation of ferrous metal parts from tumbling stones after the deburring and polishing process has been completed is one of the most common uses. Photograph shows an installation at L. C. Smith & Corona Typewriters, Inc. Replacement by magnetized pulleys of the old, hand sorting process has saved many hours of hand labor daily

wherever the special types described below are not demanded. They are the workhorses of their species.

Plate installations are commonly stationary: in spouts, chutes, hoppers and feed tables. They may be made at any angle up to about 45 deg from the horizontal. Beyond this, flow is so fast that efficiency diminishes rapidly and the hump type installation explained below is recommended.

When the models of near maximum magnetic strength are used, it is also possible to install plate magnets over shallow, slowly-moving masses.

Plate magnets clean tramp iron from a wide variety of dry materials such as grain, textile fibers, coal, rock products, tobacco, rubber, chemicals, sand and non-ferrous metals. Less frequently they are applied to the purging of slurries, slips and liquids. For these it is usually preferable to use units specifically engineered for the purpose. These are described elsewhere.

Magnetic Humps

For installations where space limitations will not permit a gravity flow chute of 45 deg or less, and for pneumatic lines, a flow-interrupting unit known as a magnetic hump is used. Strategically placed baffles direct material flow so that the two plate magnets installed on opposite faces of the hump can set up a magnetic barrier in tandem; what one misses the other catches.

This type installation is recommended where materials to be protected are moving at high velocities. It is also used to some small extent for slurries and liquids, since the unit can be made liquid tight.

For automatic separation of tramp iron from non-ferrous materials conveyed on belts (and for automatic cleaning of the separator) there is a pulley-type device. As contaminated material reaches the pulley—which may be installed in almost any position—powerful magnets attract and hold to the belt all undesirable iron and steel. The cleansed product, being non-magnetic, falls off the pulley at the natural tangent point.

The magnetic tramp metal is held to the belt until carried past a divider and out of the magnetic field. It then drops off into a bin, chute, or whatever is desired.

The pulley will work efficiently with belts of rubber, canvas, or other non-magnetic materials. It is used on a variety of contaminated articles from apples to wood chips, including such easily contaminated masses as sand, coal, bauxite, gravel, resins, grain, salt, sawdust, rubber, waste, hops, ore, tobacco and foods.

Magnetic Drums

A separator that is similar in principle to the magnetic pulley is the magnetic drum. It can be installed in any conveying system that does not use belts, and will remove tramp iron and medium-fine ferrous contamination from many products.

The drum will clean heavier flows than will plate magnets and it features the same automatic cleaning that is found in pulleys.

The drum separator consists of a revolving cylindrical shell within which a stationary high-powered non-electric magnet is located. Material is fed into the drum hopper wherein its rate of flow is regulated by an adjustable check gate. It then drops onto the revolving shell, which is made of stainless steel.

Ferrous particles are attracted to the stationary magnetic field and therefore held to the shell surface. As the latter revolves, the non-magnetic material falls freely into its discharge chute. The contamination is carried around to a point beyond a divider and out of the magnetic field, where it is released.

Pipeline Trap

Efficient, economical protection against the passage of tramp iron through pipelines which convey liquids, slurries, slips, glazes, oils and semi-liquid foods can be obtained with a magnetic trap that fits any pipeline. It is suitable for pressurized lines.

This is a simple arrangement of a metal housing and a specially engineered magnet. There are no moving parts. Cleaning is accomplished easily by removing a face plate; the trap itself stays in the line. Protection from corrosion is assured because the unit, excepting the mag-

Photo: Erie Mfg. Co.

net casting itself, is fabricated of stainless steel.

Cleansing of liquids, slips, slurries, and, under some conditions, powders is also possible with a portable unit called a ferrous cleaner. This utilizes a stainless steel chute and a fitted magnetic grid element with over a hundred fingers that reach out for the ferrous contamination. This separator operates on gravity flow and should not be installed at an angle greater than 20 deg.

Micro-Magnetic Separator

The function of a micro-magnetic separator is to remove automatically any iron particles that are contained in fine, cohesive, dry powders. These particles may range in size from 16 mesh down to tiny 400 mesh; the parent mass can be almost as small.

The unit combines mechanical and magnetic forces to effect separation. There is an inlet hopper into which mixed ferrous and non-ferrous material is directed. One outlet chute yields the tramp iron; a second the purged powder. Units capable of handling 2 t per hr have been constructed.

Tests show that this piece of magnetic separation equipment has operated at 99.25 per cent efficiency in removing fine iron from a 240 mesh aluminum oxide powder. The rate of flow was 16.6 cu ft per hr. At double the flow the efficiency was still over 98 per cent.

When small amounts of non-magnetic material must be separated from large quantities of magnetic material, an agitator separator is the ideal answer.

The project may be the reclamation of valued magnetic materials from non-magnetic waste, as in the recovery of steel grindings from abrasive grit after steel billets are surface-ground. It may be the separation of fine magnetic scrap from non-magnetic cuttings when it is desirable to save both. Sometimes it is the recovery of non-magnetic chemicals from fine iron or shot after ball-mill operations.

Photo: Eriez Mfg. Co.

In order to alleviate the problem of tramp iron in one form or another, Cleveland Slag Co. uses a non-electric permanent magnetic pulley in its processing line. The pulley is used as a head pulley on a belt conveyor following the crushing and screening operations. Average crushed slag drops from the vibrating screen onto a conveyor belt which leads to the gravity flow chute

The usual difficulty when this type of separation is attempted is that non-magnetic particles are trapped with the more profuse magnetic material as the latter is drawn into the magnetic field. Recent design advances have precluded this possibility of effecting partial separation through agitation before the mixed substance is directed to the most powerful areas of the magnetic field.

Miscellaneous Uses

Perhaps most interesting among many other and less widely used industrial magnets are the magnetic piperoll and the magnetic sweeper.

The piperoll is designed for the drag-out of pipe, and other steel shapes, from galvanizing baths. Here the holding power rather than the pulling power of the magnet is used.

Pipe, or any other shape that the roll is designed to handle, is automatically centered in the properly contoured holding surface. It can then be transported easily through steam or air blasts without the danger of droppage that exists where electrical or mechanical equipment is used. There is also a great saving in the amount of zinc consumed because with the magnetic piperoll system more of the coating metal is allowed to drain back into the bath.

The magnetic sweeper is a low cost $26.50 to $53.50 device for picking up ferrous material from floors, parking lots, plating tanks, baths, and other places. It is light in weight, since it basically consists only of a rotary magnetic tube mounted between Neoprene wheels. It works just like a carpet sweeper. Ferrous material literally jumps to the magnet and spreads itself over the entire circumference of the tube to a thickness of about ¾". Unloading is accomplished at either end by simply pushing a wiping ring from one end of the tube to the other, where a non-magnetic section causes the load to be released.

A variation of this is used successfully to retrieve metal parts or to remove contamination from baths or tanks otherwise difficult to search. The design is similar except that stainless steel is used to preclude corrosion from acids or alkalis.

The possibilities open to industrial magnets are innumerable. No attempt has been made to enumerate even those that are presently cataloged. However, from what has been described, and from the stories told in the illustrations, it is not difficult to see that magnets are an important cost-cutting tool of industry.

For Example, In Typewriter Manufacture . . . .

. . . Or, In the Processing of Crushed Slag

. . . Or, To Protect a Strawberry's Taste

In packing 20 million pounds of fruit a year it is of paramount importance, in the preparation for quick freezing, to eliminate any taste taint through contamination by such tramp iron as knife blades, basket chips, tacks or bits of wire. Not only do these permanent magnets, suspended above the strawberry lines, protect the fruit from taint, crushing and bruising, but they also keep the tramp iron menace away from the expensive processing machines. Thus they save downtime due to accidents, keep production rolling and pay for installation. Strawberry processors are but one type of food industry that has found this answer to some production and customer-relation problems

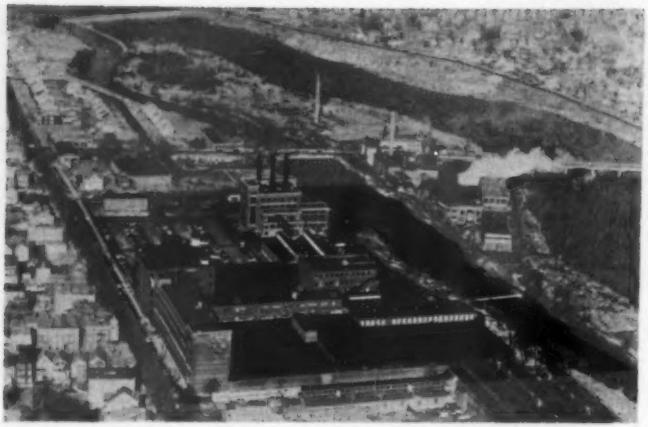


Fig. 1. The Passaic Plant from the air. The Garfield Plant, Fig. 6, is a mile away

By W. W. STARKE
Asst. Plant Engineer
Forstmann Woolen Co.

How Planned Plant Engineering Works at Forstmann Woolen Plants

Why engineering, construction and maintenance were consolidated . . . Over-all company operation . . . Plant engineer reports to president . . . Two plant operation . . . Department responsibility and organization . . . Procedures and work control . . . Project engineers and work responsibility . . . When contract maintenance is used . . . Progress and cost reports . . . Departmental promotion policies

TWENTY YEARS AGO, the Forstmann Woolen Co. consolidated all of its engineering, construction, and maintenance activities under a single Plant Engineering Department, and installed a job order system. Prior to that time, the maintenance of production machinery had been handled separately by small shops attached to the several production departments.

This centralization of all engineering and related functions has proven to be most effective for this company's operations. The organization has been found to be flexible to meet fluctuations in volume of activity, and to incorporate improvements in execution and control techniques without losing its basic structure.

The Forstmann Woolen Company is privately owned and the owners constitute the active management.

The Plant Engineer reports directly to the President, whose office is located in the Passaic Plant.

The company manufactures a wide variety of high quality woven woolen and worsted fabrics. This activity is carried out in two plants, the one located at Passaic, N. J., and the other a mile away at Garfield. Raw wool is received at Garfield, where it is warehoused, scoured, spun, and woven into gray cloth. In this form it is trucked to Passaic for finishing and dyeing. Both plants normally operate three shifts and are usually shut down on Sunday. All piece rate and hourly employees belong to the Textile Workers Union of America, C. I. O.

Machinery ranges in type from heavy scouring machinery to intricate spinning and weaving mechanisms. Much of the equipment is of foreign make with metric sizes and foreign standards. In most cases, spare parts are not obtainable from the builder, and must be fabricated at the plant. Since the product uses an expensive raw material and requires great care in processing, machinery maintenance must be of a high order, and room humidities and temperatures must be closely controlled.

The Plant Engineering Department serves both plants. The Plant Engineer's office, and the engineering and drafting, are located with the general offices of the company in the Passaic plant. Maintenance operations are controlled from shop offices located centrally in each plant. The Plant Engineering Department is charged with the following responsibilities:

1. **All engineering, including that required for the purchase of new production machinery and for plant development**
2. **Operation of plant utilities and services such as humidification, heating, air conditioning, water supply and sewers**
3. **Maintenance of all equipment, services and structures**
4. **Generation and distribution of all steam and electricity**
5. **Sanitary, janitorial and yard services**
6. **Plant protection and fire protection**
7. **Deliveries to customers in the New York metropolitan area**

Figure 2 shows the organization of the Plant Engineering Department. The following features are noteworthy:

1. Maintenance overseers are relieved of all clerical work and routine details by the job order supervisors. By setting up a total of three persons skilled in clerical work for the two plants, all overseers and foremen are free for their primary function of planning the execution of work and supervising the men.

2. There is a foreman in charge of each shift in each power house, including the day shift. The power supervisor and his assistant are free

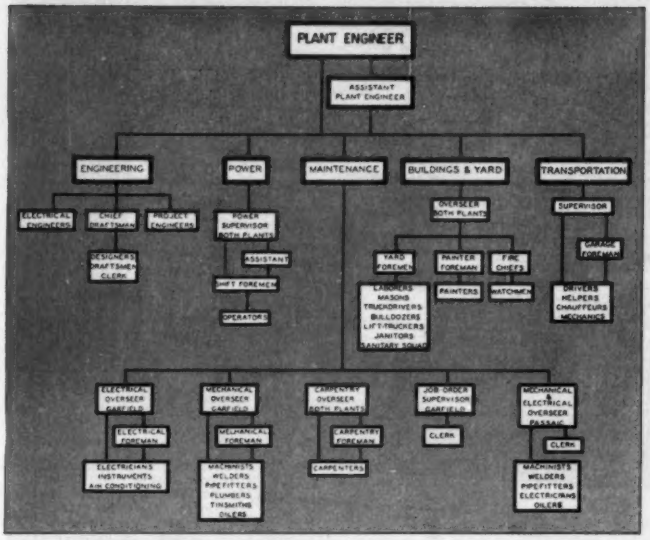


Fig. 2. Organizationwise the plant engineer, Frank L. Bradley, reports direct to the president. The plant engineering department takes care of all engineering, construction and maintenance in two plants, with about 4800 workers

from routine operating duties, and are able to devote their time to planning and to the technical phases of operation.

3. The power house performs its own maintenance, except where a mechanic's skill or a large crew is required.

Authorization Procedure

All maintenance and construction work is performed under a job order system, with individual authorization for each job as shown by Figure 2. The degree of approval required depends upon the cost of the job and the type of work as follows:

1. **Standing service orders** (about 25 in each plant) are used for certain repetitive or routine service operations for which the general labor requirements can be determined in advance. This category covers such jobs as lamp changing, electric truck servicing, coal and ash handling, floor cleaning and waste removal. The only approval required is that of the foreman, and no individual order is written.

2. **Minor repair orders** are issued for jobs costing less than $20. Individual orders are written and costs are accumulated for each job. These jobs are not estimated in detail, and the only approval required is that of the responsible maintenance overseer or foreman.

3. **Major job orders** are issued for all jobs costing over $20. Major job orders are estimated in detail, and require the approval of both the production department manager and of the Plant Engineer before work is started. Job orders over $100 require the further approval of the Controller.

4. **All project work** and maintenance work over $1,000 is performed under an appropriation system, and each appropriation request requires the approval of an officer of the company. The responsibility for the preparation, estimate, and execution of each appropriation request is assigned to a project engineer. After the appropriation is approved, the work is released for execution by means of job orders. These are written by the project engineer, estimated by the overseer who performs the work, and approved by the Plant Engineer.

5. **Major projects** of a sweeping nature or of special importance require a report prepared by the Engineering Department in cooperation with the other departments involved. When management approves the proposed undertaking, the work is released for execution by means of one or more appropriation requests.

Execution of Work

In the course of a single month, the system clears some 1,300 minor repair orders, 250 major job orders, and 10 appropriation requests. Responsibility for the execution of each item of work is assigned to the person most intimate with the job.

Each appropriation request is assigned to a project engineer, who is responsible for its scheduling, execution, and costs. Standardized forms are provided for this control. Each job order is assigned to an overseer or foreman. This is the key supervisor responsible for its scheduling,

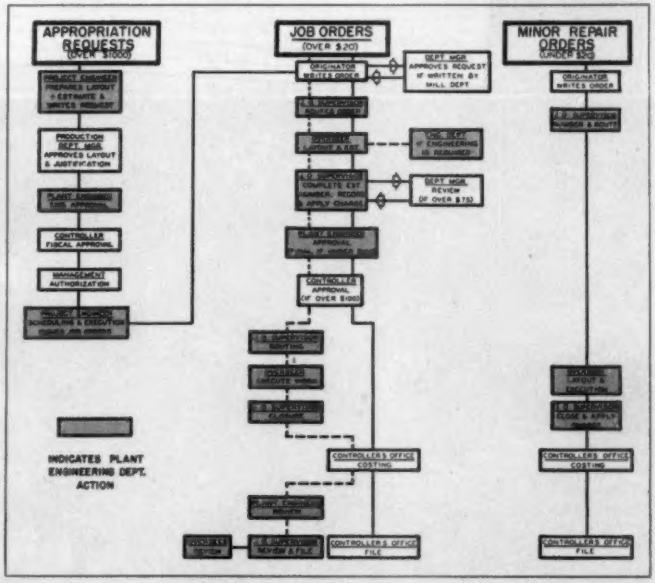

APPROPRIATION REQUESTS (OVER $1000)
JOB ORDERS (OVER $20)
MINOR REPAIR ORDERS (UNDER $20)
ORIGINATOR WRITES ORDER
DEPT MGR APPROVES REQUEST IF WRITTEN BY MILL DEPT
PROJECT ENGINEER PREPARES LAYOUT + ESTIMATE & WRITES REQUEST
PRODUCTION DEPT MGR APPROVES LAYOUT & JUSTIFICATION
PLANT ENGINEER FOR APPROVAL
CONTROLLER FISCAL APPROVAL
MANAGEMENT AUTHORIZATION
PROJECT ENGINEER SCHEDULING & EXECUTION
CONTROLLER APPROVAL OF OVER $100
INDICATES PLANT ENGINEERING DEPT. ACTION
CONTROLLER'S OFFICE COSTING
CONTROLLER'S OFFICE FILE

Fig. 3. Flow of work authorizations in the plant engineering department for three different types of orders as determined by job costs. Repetitive and routine service operations are done on approximately 25 standing service orders

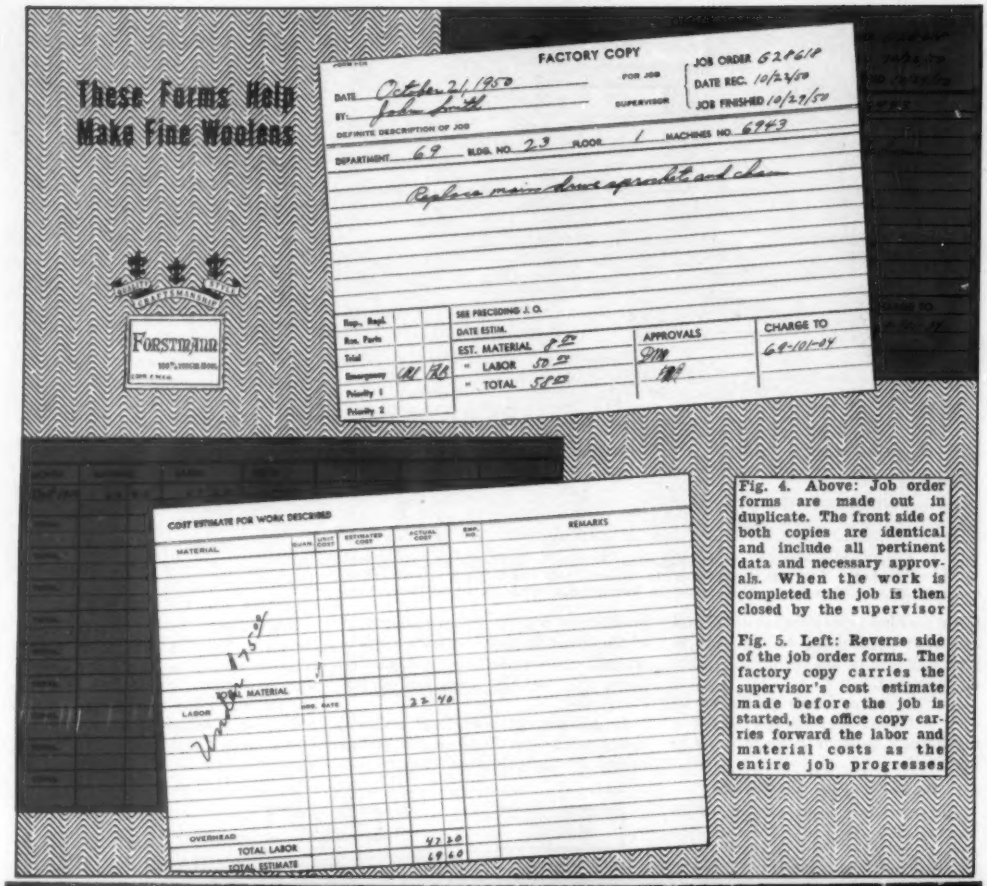


Fig. 4. Above: Job order forms are made out in duplicate. The front side of both copies are identical and include all pertinent data and necessary approvals. When the work is completed the job is then closed by the supervisor

Fig. 5. Left: Reverse side of the job order forms. The factory copy carries the supervisor's cost estimate made before the job is started, the office copy carries forward the labor and material costs as the entire job progresses

Fig. 6. The Garfield Plant receives raw wool which is scoured, spun and woven into gray cloth. At the Passaic Plant this cloth is finished and dyed before one of the plant engineer's trucks delivers it as one of the famous Forstmann woolens

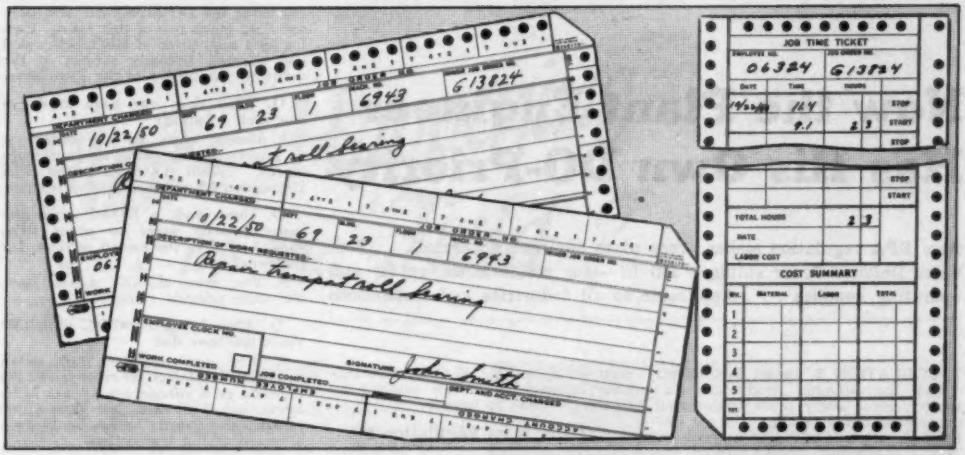


Fig. 7. Minor repair order forms used for jobs costing less than $20. The first copy is carbon-backed, the second is heavy stock, with the reverse side used as a record form for labor and material costs. Costing is done by the comptroller

execution, and costs, and for the coordination of his work with the work of other crafts.

Material requiring engineering specifications is bought on purchase requisitions written by a project engineer. Material requiring shop specifications such as steel, conduit, concrete or lumber is listed by the overseer. The purchase requisition is written by either the Overseer or the Job Order Supervisor. When material is received, the Job Order Supervisor issues a Stores Requisition to charge the material to the proper job order. Frequently used maintenance materials are kept in stock in a central storeroom adjacent to the maintenance shop. Such items are withdrawn by the issue of stores requisitions as they are used.

Contract maintenance is used where it is of advantage on specialized work such as motor rewinding, painting, window cleaning, pattern making, special heat treating, elevator inspection, water coolers, disinfectant service, and insulation. Contract maintenance is also used to augment the capacity of the various crews during peak periods.

Scheduled preventive maintenance is used wherever failure in service will cause a serious production loss, safety hazard, or costly repair. This type of maintenance is applied particularly to equipment such as instruments and controls, special motors, electric trucks, elevators, air conditioning, and steam and power generation.

Area mechanics are assigned to work in production departments in which there is sufficient maintenance activity to fully occupy one or more machinists. These men are available to take care of machine stoppages immediately when necessary, but they normally report only to the mechanical overseer for instruction and assignment.

Reports and Statistics

All material is withdrawn on stores requisitions issued by the Job Order Supervisors. Completed stores requisitions are costed by the purchasing department and sent to the controller's office, where these costs are accumulated against the proper orders.

All time applied to minor repair orders is punched by the workmen directly on the minor repair order form, which is totaled, key punched, and coded by the maintenance clerk. When completed, the order form is forwarded to the controller's office. Time applied to major job orders is punched by the workmen on separate job time tickets which are similarly totaled, key punched, and forwarded to the controller's office.

The controller's office accumulates and reports all labor and material costs against each minor repair order and job order. Labor estimates and reported costs are made up by using a flat average hourly rate, which includes overhead.

Reprints of this article are available upon request to the Editor.

The Job Order Supervisors maintain progress report sheets for each job order. These sheets list in summary form the requisitions issued, the material deliveries, and the manhours applied each week. This information enables the foremen and project engineers to check the material and cost status of each job at all times.

This organizational setup has been tailored to meet the specific requirements of this company by the original basic planning, and by evolution over the years. It has been necessary to revise the scope of certain jobs from time to time in order to meet changes in plant activity and personnel. Younger men in the process of outgrowing their jobs have been given increased range of activity, or have been lost to promotion elsewhere. Older men declining in physical vigor have had to be supplemented by assistants in order to realize their fullest capabilities.

W. W. STARKE was graduated from Cornell in 1927 with a degree in mechanical engineering. He spent four years with Stone & Webster Engineering Corp. of Boston on design and construction of industrial plants and central stations. In 1932 he joined Forstmann Woolen Co. as a mechanical engineer working on the design of two power plants and the dye house. From 1934 to 1936 he was in Buffalo with the National Aniline & Chemical Div. of Allied Chemical Co. as power development engineer and technical assistant to the power supervisor. He returned to Forstmann Woolen Co. in 1937 in the capacity of assistant plant engineer

Now the Plant Engineer Has His Own DO-Priority

New NPA regulation makes every plant engineer a general . . . Provides Defense Order rating — DO 97 — for maintenance, repair and operating supplies . . . Applicable to all industries and institutions

REGULATION 2, issued last month by the National Production Authority, gives every plant engineering department equal standing with the Defense Department in the priority set-up. This is commonly referred to as the Defense Order or DO system.

Orders rated under this system must be filled before unrated orders. As originally set up last fall[1] by Reg. 2, orders for capital expenditures, machine tools, maintenance and operating supplies could not be rated. Successive amendments to Reg. 2 have been made relaxing the original limitations. The latest is Regulation 4, the Plant Engineers Own! It covers maintenance, repair and operating supplies, and capital expenditures up to $750.

Every plant engineer should have a copy. Many details are covered in the questions and answers following. Note specifically that: Provisions of basic Reg. 2 must be followed and NPA regulations do not cover electric power, farm equipment, fuels or transportation services. Also no ratings can be issued for: mineral aggregates, ores and scrap, central steam heating, waste paper, wood pulp or water.

Again, equipment needed for the production or processing of rated orders must be obtained under the DO 98[1] classification. This requires the completion of a NPAF-2 form which must be authenticated by the local procurement office of a military department.

On February 12, NPA amended the delegation of authority to issue DO ratings to the Defense Department, AEC, NACA and the Coast Guard. This amendment permits rating of orders for commercial office furniture and supplies as well as other non-industrial miscellaneous items. For the Defense Department, this comes under DO-21[1] Miscellaneous. The ratings must be issued by the procurement agency.

Before proceeding with the details of Reg. 2 there is a forecast. There has been delay in some military production due to lack of material, notably steel, aluminum and zinc. Heretofore, supplies have been required to devote a relatively small percentage of output to rated orders. The Munitions Board has requested the removal of limits on the filling of rated orders. Keep a close watch on NPA M-Orders. Be sure your company is on the mailing list to receive these as issued!

[1] See What's Ahead on Wartime Controls, page 45, January 1951 issue.

[2] Recently the NPA made public the list of DO symbols used in rating orders under the mobilization program. This has been duplicated. If you want a copy, write the Editor or mark "DO Order" on the postcard, pages 37 or 107.

Q and A on Regulation 2

Q. What is the purpose of NPA Reg. 4?

A. To provide a ready means whereby all establishments and institutions may when necessary use a priority rating to obtain what they require for maintenance, repair and operating needs. It applies to: all business enterprises, large or small, whether engaged in retail or wholesale trade or in manufacturing; institutions, schools, hospitals and churches; and Federal, State, Municipal and other government agencies.

Q. How does Reg. 4 accomplish this purpose?

A. It permits all business enterprises to use an extendible DO-97 rating to obtain needed maintenance, repair and operating supplies (MRO).

Q. What is meant by extendible DO-97 rating?

A. Under NPA's basic priorities system, certain essential production is given preference. DO-97 is the preference symbol[2] assigned by NPA for use on MRO orders for supplies. This preference rating may be extended by the person receiving the rated order in the same way as any other DO rating may be extended.

Q. Is any special authorization required from NPA for the use of the rating?

A. No. The regulation is self-explanatory and the rating may be used by any concern in accordance with Reg. 4 and 2.

Q. Is there any limitation on the amount of these supplies a business or institution may obtain?

A. Yes, in general MRO supplies may be obtained only in the same dollar amount spent for such supplies during 1950.

Q. Must MRO quotas be figured on a quarterly basis?

A. Yes. Simply divide the amount spent for MRO in 1950 by four to give the quarterly quota. Either the fiscal year or the calendar year may be used in establishing quotas.

Q. Is a business or institution required to use a DO-97 rating to acquire the MRO supplies it needs?

A. No. MRO may be obtained without using the DO rating. But if a person does make use of this rating, then his total acquisition of MRO, both rated and unrated, becomes subject to the quarterly limitations of the Regulation.

Q. What does one have to do to use such a rating?

A. Merely write on the order, or on a piece of paper attached to it, these words: "DO-97, Certified under NPA Regulation 4," and then sign your name.

Q. Does such a DO-97 carry the same priority value as other DOs, those issued by the armed services, for instance?

A. Yes, since all DO ratings have the same priority value.

Q. After using a DO-97, what else must the user do?

A. If he uses more than $1,000 worth of MRO per quarter, he must record the expense as a charge against his MRO quota, but if he uses less than $1,000 of MRO per quarter he need only keep a record of the transaction.

Q. Does every firm or institution using DO-97s have to keep records of its MRO purchases?

A. Yes. The NPA requires that all persons using the DO-97 rating must keep complete records and preserve them for the duration of this Regulation and two years thereafter.

Q. Is any particular accounting system required in these records?

A. No. Any system is satisfactory, provided that it will disclose the information needed by the NPA for an adequate audit.

Q. Is there any provision in the regulation for minor capital additions?

A. Yes. NPA permits the use of the rating for minor capital additions not exceeding $750 for any one complete capital addition.

Q. Nearly three months of the first quarter of 1951 are now gone. How does a person figure his MRO quota for the remainder of this quarter, up to April 1?

A. This is covered in Direction 1 issued in conjunction with Reg. 4. In general it provides that the person must first figure his quarterly MRO

(Continued on page 100)

Every PE Should Have These

1. NPA Reg. 4, covering rating DO 97 for MRO supplies.
2. NAA Reg. 2, Basic rules of the priorities system and listing materials and products NOT subject to ratings.
3. NPA Reg. 1, Basic rules for inventory control and quantities.
4. Complete M-Order list covering some 22 raw materials and semi-fabricated materials.
5. List of NPA Field Offices.

WRITE for copies to National Production Authority, Office of Public Information, Room 5004, Commerce Bldg., Washington 25, D. C.

What's Happening ... in the Field?

RF Generator Puts Heat on Plywood

THE APPLICATION of a 2 kw, 13.6 megacycle, radio-frequency generator to this press makes it possible to bond three pieces of plywood into a chime clock case in 90

Photo: Westinghouse Electric Corp.

seconds. Previously-used animal glues, air dried in the rotating rack in the background, required a minimum setting time of 4 hr under ideal conditions.

Concrete Girdle for Bulges at Surgical Goods Plant

A BULGING half-century-old brick dike at the Johnson & Johnson surgical supply plant in New Brunswick, N. J., called in a surgeon of its own recently. These industrial surgeons, the Wigton-Abbott Corporation, engineers and contractors of Plainfield, N. J., prescribed a concrete girdle.

The foot-thick dike, whose irregularly shaped, 212 ft perimeter surrounds a 120,000 gal fuel oil tank on the banks of the Raritan Canal, rests on a 30-in. thick concrete retaining wall on the canal side. Because of frost action, and the age and condition of the lime mortar joints, the retaining wall had begun to bulge toward the canal and the dike was no longer capable of sustaining hydraulic pressure in the event of an emergency.

To reinforce the brick dike, two continuous concrete belts were formed entirely around the outside perimeter of the dike wall. The lower belt, 23 in. wide and 16 in. high, was placed parallel to and approximately 11 in. above ground level; the upper belt, approximately 19 in. wide and 12 in. high, was placed 5 ft above the lower one.

Between the upper and lower belts, concrete ribs were constructed at 5 ft intervals, forming a 5 ft square grid

support for the wall. Because of the irregular shape of the enclosed area it was necessary to tie-in the girdle by concrete tie beams running across the width of the enclosure. These beams were located so as to clear the steel oil tank and they divided the area into three roughly rectangular areas. After the concrete work was completed, the interior of the brick dike was given a seal coat of 1-in. cement plaster. Steel struts across the canal, supported by "dead men," prevented further movement of the wall into the canal.

Motorized Torches for Smooth Curves, Nice Shapes

SHAPES THAT are smooth and uniform are assured through the use of motorized torches added to the shape-

What's Happening ... in the Field?

cutting machine in its Chicago warehouse by United States Steel Supply Company, a U. S. Steel subsidiary. This pantagraph is the first one to combine motorized torches with an electric tracer.

The operator uses the switch on the electric control panel to maintain the proper space between torch tip and plate surface during operations. It is no longer necessary for him to climb up on the plate to adjust the torches, thus affording a higher degree of safety and efficiency.

10,000 Gal of Storage — Ready in Ten Minutes

CONVENTIONAL, BOLTED steel tanks for storage of petroleum products did and will continue to do a job for the armed forces. But, when storage is needed in a hurry the 10,000 gal collapsible container shown in the photos here, will solve a lot of problems when landings have just been made, or when other unusual conditions make time needed for steel tank erection unthinkable.

Developed by the Engineer Research and Development Laboratories at Fort Belvoir, Va., this container is the end product of continuous research since early in World War II. One difficulty in early models was caused by the creasing of the container while in storage. Various shapes of containers were tried but the "pillow" unit shown was the one which met all the requirements; it is made of Buna N synthetic rubber reinforced with inner and outer layers of nylon cloth, all formed into a 3/32 in. sheet. The inner layer of nylon cloth has an adhesive coat, a liquid coating of nylon to serve as a barrier to combat porosity, and a layer of Buna N which is in contact with the gasoline.

Photos: Corps of Engineers, U.S. Army

The container was tested for many things: objects were dropped on it; it was left in storage for 12 months; it was subjected to use at minus 45 F; it was filled to 150 per cent of capacity before it finally burst. Tests are still going on.

It is quickly readied for use merely by rolling it, like a rug, from its protective box. The only requirement for installation is a flat site which is free of sharp objects. The Department of Defense hopes that industry, too, will find a use for the container.

Lights, Cells, Open and Close Gates

THE TWO GATES at Greyhound Bus Terminal in Detroit, through which outgoing busses pass, are now operated by five high powered spotlights and five electric eye units and allied electrical equipment. The installation has released three gate operators for the performance of other pressing duties.

Three of the five groups of lights and "eyes" are installed on one gate; two on the other gate. As long as the lights are prevented from shining on any one of the five electric eyes the gate remains open. The third set

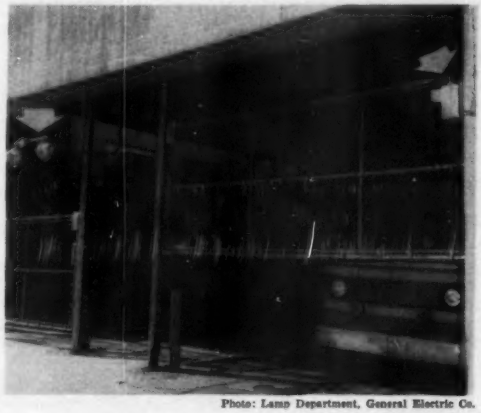


Photo: Lamp Department, General Electric Co.

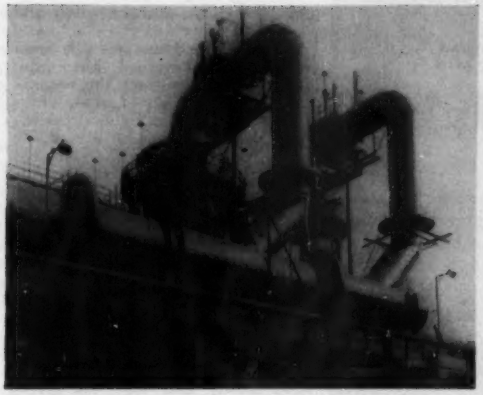
is installed so that the small intra-city busses (which are short enough to fit between the outside cells) may hold the gates open.

To fill the requirements for a powerful but concentrated light source for exciting the photoelectric cells, engineers decided upon a new 300-watt narrow-beam spot lamp. Side brightness was reduced by the use of aluminum shields with a restricting orifice 2⅜ in. in diameter around the face of the lamps. The photo shows the exterior of the gates, the two outside lights and one electric eye unit. When the tail of the outgoing bus has passed this group the gates are free to close again.

Smokeless Smoke Stacks Save Steel

SMOKELESS STACKS on the new boiler plant of National Tube Company's National Works, McKeesport, Pennsylvania, are not a sign of slack business but of the cooperation of industry with the smoke control program of this busy steelmaking center. Designed to produce an absolute minimum of fume and solids in waste gases, the new boilers are fired with gas from this U.S. Steel plant's four blast furnaces, with pulverized coal as an auxiliary fuel.

An average of 17,400,000 cu ft of gas an hour is produced by the four blast furnaces. Of this amount, ap-



proximately 69 per cent, or 12,000,000 cubic feet is available for use in the new boiler house.

Gas cleaning is accomplished in two modern gas washers and two electro-static precipitators. A main, 9 ft in diameter, conducts the gas from the furnaces to the washers. Based on a capacity of 230,000 cfm of gas, the washers reduce the dust content to 0.25 grains a cubic foot by passing the gas through multiple fine sprays of water.

From the washers the gas passes to two double-compartment precipitators. Here it flows through a high-tension electrical field, becoming part of the electrical circuit, with the result that the solids are precipitated through the action of electrostatic charges. The precipitators reduce the dust content of the gas to 0.01 grains a cubic foot.

The dust in the precipitators is washed away constantly and flows by gravity to a 90-ft diameter multiple-trough thickener. The sludge effluent from the wet washers is pumped to this same thickener.

The settled solids from the thickener are pumped directly to a drum-type vacuum filter which can produce 172 tons of filter cake in 24 hr. This cake, with a moisture content of 25 per cent, is scraped from the drum and dropped directly into cars for removal to the ore stock pile for recovery by sintering.

One-Man Cleaning Room Handles 2500 Castings a Day

STRAIGHT-LINE layout of the cleaning room at the new Fairbanks-Morse Freeport Works enables one man to clean 2500 ten-pound castings in an 8-hr day. The room is equipped with a 14-ft rocker-barrel and a 9-ft Rotoblast table. An overhead conveyor system brings the castings direct from shakeout to the cleaning station. The hooks on the conveyor are ingeniously arranged—four way fittings into which short lengths of pipe may be slipped to permit as many as sixteen pump body castings to be carried on each hook.

Photo: Pangborn Corporation

Castings range in size from 2 oz to 120 lb, and average 10 lb each. The larger castings are picked off the conveyor by the operator and placed in the skip of the automatic loader of the barrel. Flat castings or fragile parts which might be damaged by tumbling go onto the table. The revolving platform of the table is set for 3¼-minutes-per-revolution, and each casting passes through the centrifugally propelled stream of abrasive twice, once for each side. Castings are cleaned to bare metal in the barrel in five to seven minutes.

Skid bins handled by electric fork trucks contain cleaned castings which are moved for assembly into the motors and pumps manufactured by the company.

Production Increased 20 Per Cent with New Brushing Method

A 20 PER CENT increase in production, plus a uniform surface finish prior to plating is now being obtained by a large midwest sporting goods manufacturer by utilizing a new brushing method.

A five-station machine is solving the problem of removing heat-treat discoloration and surface imperfections on tapered golf shafts.

Photo: The Osborn Manufacturing Co.

Due to the tapered "step-down" design of the cold-drawn, heat-treated, high-carbon, seamless steel shaft, it was a problem to get into the "step-down" corners. With the former method, two or three passes were necessary to do the job.

With the brush method, only one pass is required to turn out a better finish at a rate of over 1500 shafts per 8 hour shift, or 10 ft of shaft per minute.

The shaft is hand fed into the first station. A power infeed keeps it moving until it passes the last brush. The first station breaks the discoloration; brushes are used to prevent bridging the "step-down" corner.

Vinyl for Safety Glass Dried by Radiant Heaters

AN INSTALLATION was recently made using radiant heaters for drying the vinyl sheets used in making safety glass. The problem was to completely dry the sheeting prior to sandwiching it between the two sheets of glass.

The vinyl sheeting as originally manufactured has 2 to 3 per cent moisture. If the material is left exposed to the air, it will pick up additional moisture since it is hygroscopic. To retard this and also to prevent the sheets

(Continued on page 102)

Plant Engineers Form New Chicagoland Club

Plant engineers, representing industries from Waukegan, south to Hammond, and from the lake west to Argo, organize parent club as a nucleus for five local clubs in the Greater Chicago Area

TO COPE WITH the increasing impact of the defense program on industry, a group of engineers recently formed the Plant Engineers Club of Chicago. The initial meeting was held March 9 at the WSE Club rooms in Chicago.

A club of this type had been under consideration for some time. The actual start was hastened, however, by the urgent current need brought about by the defense program. New products, changes and shortages have thrown new and added burdens on the plant engineer. The club is designed to provide a medium for plant engineers to meet and discuss their common problems and exchange experience— actually an informal board of consulting specialists.

Recognizing the limitations of a single club to meet the needs of a large industrial center such as Chicago, as well as the importance of travel time in a crowded day, the founders have already laid plans for several local clubs. Members attending the first meeting represent several different districts and will eventually form the nucleus of clubs in their own districts.

What is known as Greater Chicago or Chicagoland is divided into several distinct areas from the standpoint of geography and transportation. Plans call for local clubs in the following areas: Waukegan-North Chicago; the Loop; Lake Calumet, including South Chicago, Whiting, Hammond and Gary; Clearing-Chicago Industrial District; and Joliet-Elgin-Aurora, south and west.

Club policies have not yet been completely determined but quite likely will approximate the organization and practices of other clubs already in operation. Some consideration has been given to a standing committee made up of the president and secretary of each of the five local clubs, for coordination and to arrange details for an occasional joint meeting.

At the initial meeting, T. S. Ramond, of Goodman manufacturing Co., Chicago, was elected temporary chairman and D. W. J. Brown, of the Corn Products Refining Co., Argo, was elected secretary. The second meeting will be held April 6.

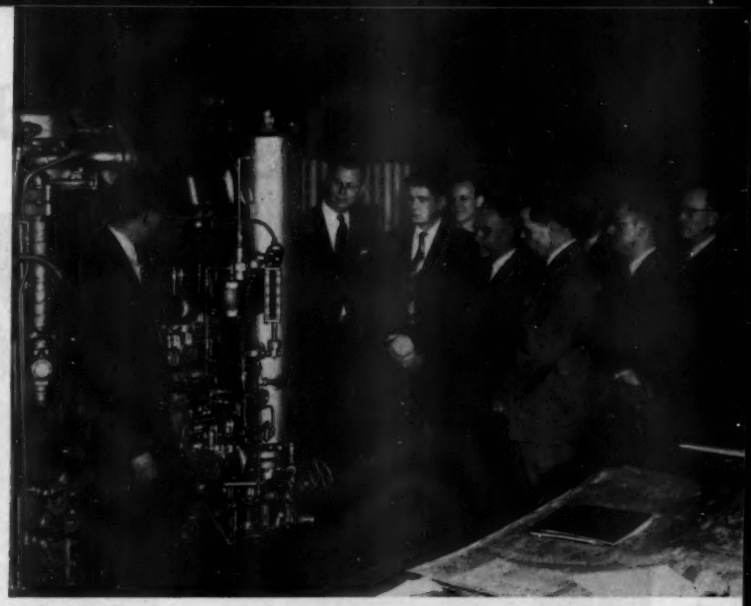
Club members have decided to build slowly and take the spring months to determine operating and expansion policies. The five local clubs will be formed in the fall as rapidly as circumstances permit.

Plant engineers in the Chicago area interested in membership should write to the chairman, secretary or any of the charter members.

This club movement has sprung up simultaneously in all sections of the country. At the moment, some 20 clubs are in the process of formation. Plant engineers in other sections of the country interested in a similar club in their vicinity should write to PLANT ENGINEERING.

Plant engineers of Greater Chicago at the organizational meeting on March 9. Unless otherwise indicated in the legend below, the address is Chicago. T. S. Ramond was elected temporary chairman and D. W. J. Brown elected secretary

1. Tom Hanson, Managing Editor, Plant Engineering.
2. Marion M. Anderson, Container Corp. of America.
3. L. A. Dickerhofe, Helene Curtis Industries.
4. Ed. Benson, Ingersoll Prods.
5. Fred L. Leason, Jr., Interstate Bakeries Corp.
6. M. D. O'Hern, American Steel Fdry., Hammond, Ind.
7. Robert E. Irvine, Atlas Boxmakers, Inc.
8. H. G. Anderson, Link Belt Co.
9. J. K. Haugan, Union Special Machine Co.
10. S. A. Simonson, Chicago Hardware Fdry., N. Chicago.
11. Walter Painter, Readers Service, Plant Engineering.
12. H. E. Byrne, Taylor Forge & Pipe Works.
13. T. S. Ramond, Goodman Mfg. Co.
14. Homer B. Zoeter, Continental Can Co.
15. Richard H. Morris, Editor, Plant Engineering.
16. D. W. J. Brown, Corn Products Refining Co.
17. W. D. Owen, The Visking Corp.
18. E. F. Hanford, Lever Brothers, Hammond, Ind.



Left to right: Arthur Landsverk, instructor, CE-S; C. L. Westendorf, E. I. du Pont de Nemours, Wilmington, Del.; Russell McCue, Stocker Manufacturing Company, Netcong, N. J.; Byron Round, CE-S; Frank Di Ianni, Riggio Tobacco Corporation, Islip, N. Y.; B. S. Norling, E. I. du Pont de Nemours, Wilmington, Del; Frank Schultz, Dept. of Inspection of Steam Boilers, Chicago, Ill.; Edmund Enoksen, CE-S; James McKeague, Dept. of Inspection of Steam Boilers, Chicago, Ill. Boiler shown in foreground is industrial type; locomotive type, hooked up for operation, is barely visible in right background

Boiler School Teaches Operators Confidence in Self and Equipment

A SERVICE SCHOOL, testing to see whether such a school will pay dividends in customer relations, lowered service costs and better equipment operation, has been inaugurated by Combustion Engineering-Superheater, Inc., in its East Chicago, Ind., plant.

Thus far, no decisions have been made regarding the school's span of life or future course; however, J. F. Griffin, Chief Engineer, made the observation that "customers who have had their men attend these classes have made fewer service calls and, in some cases, have even installed their own units before the company's field engineers arrived." Even if one swallow does not make a summer, these few feathers in the wind may augur well for the school's continuation.

The school's prime purpose is to teach owners, plant engineers, maintenance superintendents, and others, the facts regarding their new property, the C-E Controlled Re-Circulation Steam Generator. This includes teaching them proper maintenance techniques, showing them how the unit is constructed, allowing them to operate it, and generally imbuing them with confidence in the unit's ability to operate safely under practically any and all conditions.

The school opened in a specially set up steam generator demonstration room. This room, in addition to several instrument and other demonstration panels, is equipped with two steam generators. One of these, a locomotive type unit, is installed ready for operation. The second, an industrial unit, is on the floor to permit parallels and differences between the two units to be pointed out.

An operation demonstration, designed to brief the students on the over-all functioning and control of the unit was followed by a lecture on the design principles of the generator.

This session, as were most of the others, was capably conducted by Instructor Art Landsverk, erstwhile test engineer. The one idiosyncrasy exhibited in Mr. Landsverk's conduct of the class was occasioned by his apparently unfeeling feet. To the already frigid atmospheres of the room, Mr. Landsverk breezily added the outside atmosphere by gaily tossing open the window. All this, it was sagely pointed out later, attested to the excellent insulation with which the unit was equipped.

Following the briefing on operation and the lecture on design principles (and lunch) a tour and inspection of the assembly line permitted those present to inspect the component parts and study their operation as individual units. This, in turn, was followed by another session on operation. Now the individuals were put in charge of the unit, one by one. Adjournment to the conference room and an interesting bull session wound up the first day's activities.

General instruction on the unit's operation (with a closed window) was continued on the second morning. Once again, the careful integration of the course was demonstrated. After having viewed the controls and other component parts on the previous afternoon, and with a knowledge of construction of these units under their belts, the students were led through the details of the coordinated operation of all the controls, wiring, alarms, piping, pumps, blower and burners.

Those attending the class were cautioned regarding heavy fuel oil burning. Details, particularly those of heating and return oil arrangements, must be carefully engineered. One of the field engineers told of an installation where trouble was encountered with No. 6 fuel oil. Upon investigation they found that the heated fuel oil line to the burners was exposed for quite a few feet of its length, to the sub-zero weather. Naturally, the fuel oil thickened a bit (to put it mildly).

Instruction on trouble shooting and another tour of the plant for subassembly fabrication completed the school. The two other members of the excellent faculty were Byron Round and Edmund Enoksen, both CE-S engineers.

V-Belts Can Take It, But Why

By FRANK H. RUMBLE, V-Belt Specialist, Allis-Chalmers Mfg. Co.

Fig. 1. Examples of standard V-belts which have come in contact with oil. Note swollen condition of belts and disintegration of covers. The remedy is to use special oil-resisting belts wherever belt contact with oil is unavoidable

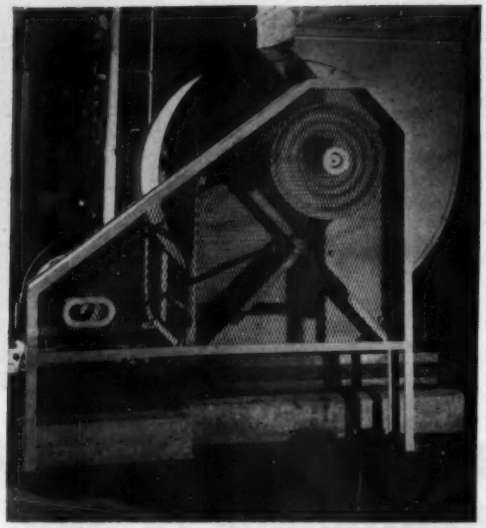


Fig. 2. Guards or covers for V-belt drives in warm atmospheres should be of the open type whenever possible to permit circulation of air around the drive. This lengthens life by preventing overheating. Visual inspection is easier

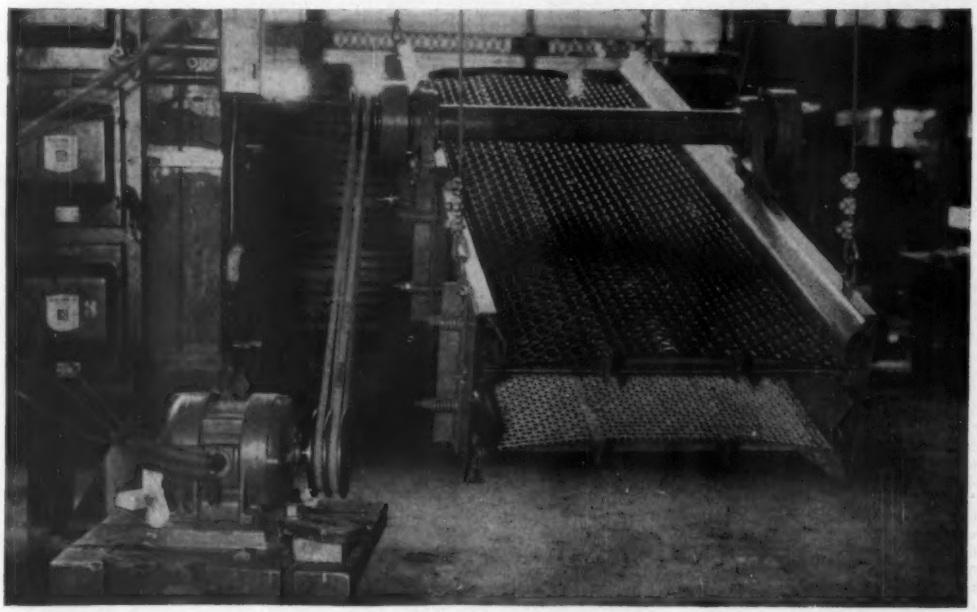


Fig. 3. Driving and driven shafts should be parallel, and sheaves should be lined up, in order to obtain the longest life from a V-belt drive. Note this set-up of a vibrating screen drive with intentional 5-in. misalignment and motor 15 deg out of parallel alignment. The drive operated but wear was soon apparent on sides of belts and in grooves of sheaves

Dish It Out Unnecessarily?

When properly engineered the V-belt drive provides one of the most flexible, economical and efficient means of power transmission. Like any other mechanical device, however, it does require some maintenance, and some attention to proper installation and usage. One of the most common causes of occasional below-par belt performance is lack of proper tension on the belts. Knowledge of what may happen and why it happens is invaluable. This picture story illustrates some of the most important "do's and don'ts" of V-belt drive care which must be observed

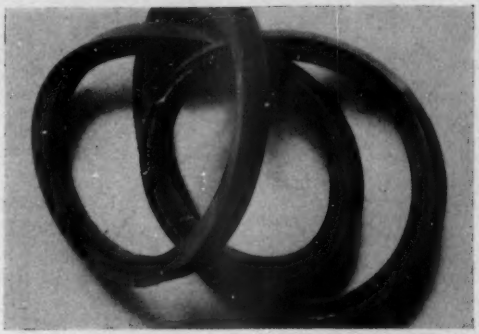


Fig. 4. Cover burned away on belt having inadequate tension. Burning caused slippage in sheave groove when machine was started. Starting torque frequently spins driving sheave on drive having loose belts. Remedy: Put adequate tension on belts, make sure drive can care for overload factor on start

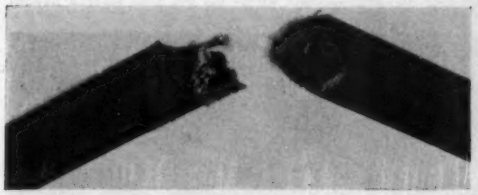


Fig. 5. A "snub" or clean break, the result of having belts too loose, can happen to a practically new belt. Caused by backlash which throws tremendous jerking action on one belt of drive. Belt also generally shows evidence of slip along its surface. Remedy: replace with new set and proper tensions

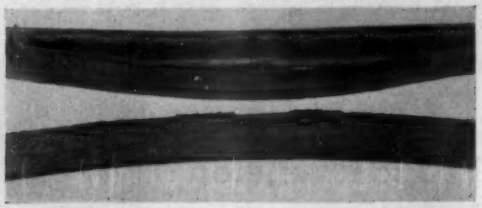


Fig. 6. Ply separation of belts, the result of using them on sheaves with too-small pitch diameter. Extreme flexing and bending of belt develops heat and internal destruction thus causing it to split longitudinally. Remedy: Be sure sheaves are not smaller than minimum recommended by manufacturer

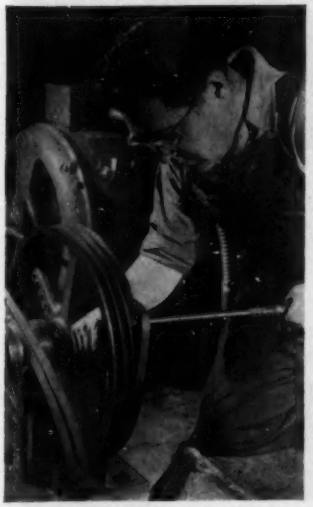


Fig. 7. V-belts should never be pried over the sheave flange. Such treatment often breaks or ruptures the pulling cords. Precaution: Slack the belts sufficiently to permit placing or removing them with the hand without use of tools

Fig. 8. A sufficiently-long straightedge is handy when determining if sheaves are lined up properly. If the straightedge touches the outer edges of both driving and driven sheaves simultaneously, they are then in good alignment

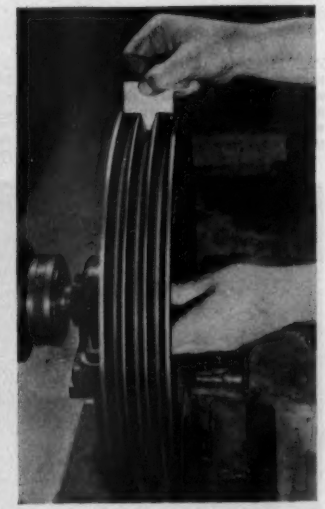


Fig. 9. A template is useful in checking the grooves of sheaves to see whether the walls are true and provide a straight line contact with the belts. If groove walls are worn or damaged the sheaves must be regrooved or replaced

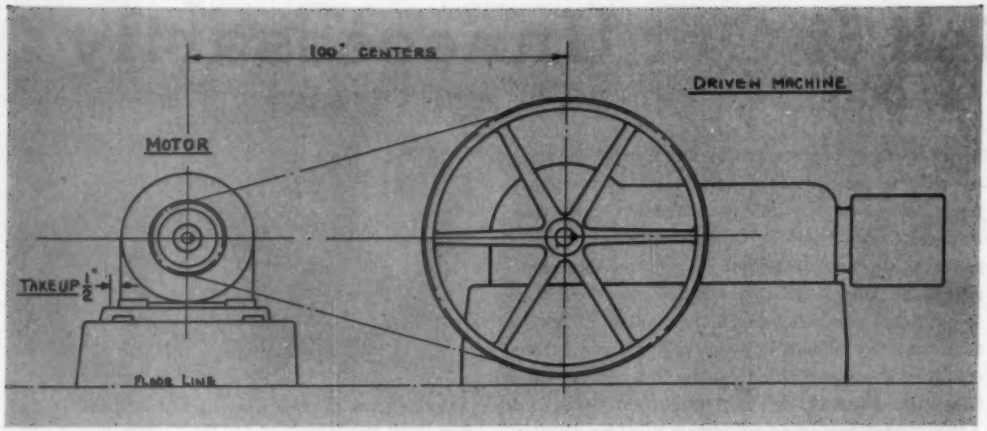


Fig. 10. To operate under proper tension V-belts should have about 0.5 per cent of stretch. A practical way to obtain this on any V-belt drive, new or old, is to proceed as follows: After belts are fitted in the grooves properly, move motor away from the driven machine until all sag is eliminated. Then make an additional take-up of ½ in. for each 100 in. of center distance. In the example shown in the sketch, the center distance becomes 100½ in. If original center distance, when sag is removed, is only 50 in., move the motor ¼ in. to make 50¼ in. This will approximate about 0.5 per cent stretch needed

Proper Tension Is Important, Too . . .

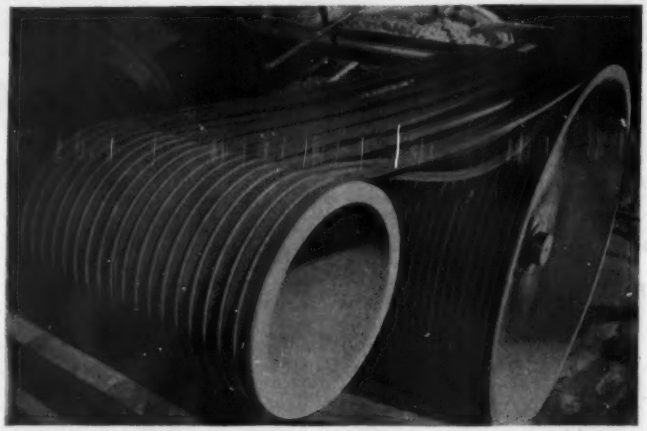
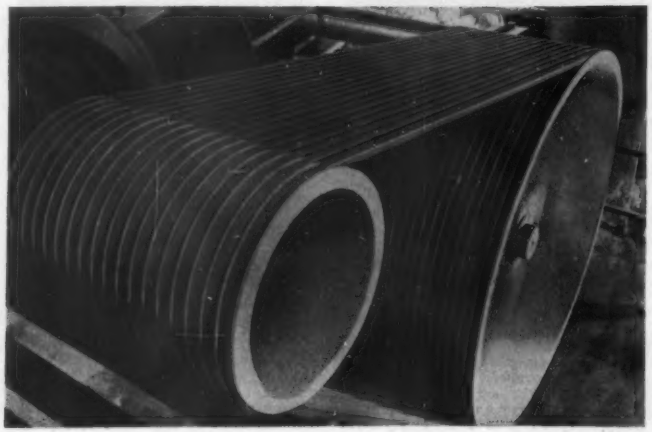


Fig. 11. Inadequate tension can mean excessive wear and slipping belts as well as an unsightly drive. Sagging belts may set up a "whipping" action, which will cause them to stretch still more or sometimes to suddenly break



. . . For Long V-Belt Life

Fig. 12. This is the same drive as above but with adequate tension (0.5 per cent stretch) placed on the belts. It required a relatively small amount of take-up to remove the sag and permit all belts to work together as a team

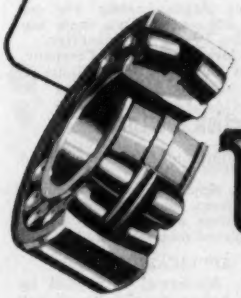
THIS STATEMENT BY THE CHICAGO PNEUMATIC TOOL COMPANY SPEAKS FOR ITSELF

"The Class O-CE Chicago Pneumatic Horizontal Duplex Motor-Driven Compressor is the first to have anti-friction roller bearings throughout. This big advancement in compressor design utilizes SKF Spherical Roller Main and Crankpin Bearings . . . this innovation in side-crank compressor design is made possible by SKF's recent development of the Oil Injection Method of bearing installation and removal.

"With anti-friction bearings many advantages are evident. Reduced maintenance time and costs, one-piece connecting rods and crank discs, a flood lubrication system and no possibility of improper bearing adjustments are among these."*

Once again SKF, by helping put the right bearing in the right place, has contributed to the engineering of more efficient equipment designed to give more dependable and economical service.

7212



8 REASONS WHY SKF IS PREFERRED BY ALL INDUSTRY

integrity
craftsmanship
metallurgy
tolerance control
surface finish
product uniformity
engineering service
field service

* For detailed information on Chicago Pneumatic Tool Company Compressors and other equipment write Chicago Pneumatic Tool Company, 6 E. 44th Street, New York 17, N. Y.

SKF
BALL AND ROLLER BEARINGS

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.
—manufacturers of SKF and HESS-BRIGHT bearings.

GUIDE TO CORROSION PREVENTION

II—Protection of Wood and Masonry Surfaces

THIS IS THE second and concluding part of the "Corrosion Prevention" series. In it we have not attempted to cover the more familiar paints known to practically all of us. These include the standard lead-oil or titanium-oil paints. The casein paints and the portland cement paints, too, have been left out because we feel that these, also, are familiar to practically everyone. We *have* attempted to present a representative section of coatings and paints specially devised for use under corrosive conditions in industry. Many of them have, besides their protective qualities, the ability to beautify the surfaces of wood and masonry; others are designed to preserve the natural appearance of these surfaces; still others, designed for even more rigorous conditions usually out of public sight, are purely utilitarian and tough.

Thermoplastic Resin

Name: C & C Vinyl Base Exterior Coating.

Type: Composed of chemically inert thermoplastic resins, to which have been added the necessary solvents, plasticizers and pigmentation.

APPLICATION

Method: Applied by spraying, preferably. Prime coats applied by brushing.

Equipment: Industrial spraying equipment with an air mask for work in confined areas; sufficient ¼ in. ID air hose for gun and ½ in. ID air hose for materials. Air supply should be compressor or plant air line capable of supplying air at pressure of 60 to 100 psi atomizing pressure; pot pressure from 20 to 25 lb is necessary. If low pressure suction type spray guns are used, the vinyls must be thinned approximately 50 per cent with C&C Thinner No. 5. Twice the recommended number of coats must then be applied.

Surface Preparation: On masonry use C&C Masonry Prep or a 10 to 20 per cent solution of muriatic acid for etching of surface. Pour or spray over surface, then scrub with broom or stiff fiber brush. Allow only 5 min for reaction and wash thoroughly with water. Allow surface to dry thoroughly. Surfaces that are excessively saturated with grease or dirt should be steam cleaned, using a combination of steam and grease-removing chemicals. After degreasing, etching is recommended. Plywood surfaces must be free of dirt, grease and other impurities.

Prime Coat: Primer should be thoroughly stirred before, and frequently during, application to insure proper suspension of pigments. Care must be taken to obtain a smooth even coat, leaving no holidays. Allow 4 hr for drying in temperatures above 70 F, and 8 hr in temperatures under 70 F. In indoor work this primer will dry in ½ to 1 hr.

Finish Coats: The finish coats may be applied by spray, using a 6 in. or 8 in. fan. All spray equipment must be clean. Use C&C Cleaner No. 10. If brush application is made it should consist of two or three wet coats and each coat should be applied at right angles to the preceding coat. Alternating of colors is recommended as it will insure thorough coverage. Over-spray, remaining on the surface after application of first coat, should be removed by brush or vacuum cleaner. From 4 to 8 hr drying time should normally be allowed for each of the first two coats, and if a third coat is applied allow 24 to 48 hr for complete drying.

Warning: Solvents in vinyl solutions are, during application, intoxicating and unsuitable for breathing. If work is done in confined areas, with poor circulation, operator should wear recommended air mask.

Coverage: The prime coat should be applied at the rate of approximately 1 gal for 250 sq ft of surface. Coverage of final coatings should approximate 250 sq ft for one coat or 125 sq ft for two coats.

PROTECTION

Acids: Protective against acids such as sulphuric, sulphurous, nitric, hydrochloric, etc., in dilute solutions. Not resistant to acetic acid in excess of 2 per cent; formic, hydrofluoric. Complete list available from manufacturer.

Alkalies: Protective against sodium hydroxide, up to 10 per cent; sodium carbonate, sodium cyanide, calcium chloride. Complete list available from manufacturer.

Others: Borax, Diesel fuel, vegetable oils, aviation gasoline, etc. Get full list of all chemicals from manufacturer.

Manufacturer: Casey & Case Coatings Co., PO Box 151, Maywood, Calif.

Bonding Over Masonry

Name: Flexrock Longlife.

Type: Longlife is a heavy paste designed for protecting and preserving masonry, and for plaster-bonding over masonry.

APPLICATION

Method: May be applied by troweling or by "gun" application. No thinning is required. When used on masonry floors of any type it may be applied with a broom; brush application on other types of masonry surfaces where spraying may be difficult.

Thinners: Longlife is free of solvents, chemicals, fillers or fibers. Water is added to keep it in usable condition until it is applied; then the water evaporates.

PROTECTION

Multi-purpose: Longlife affords durable protection against water, contraction, expansion, acid fumes, and vibration.

Coverage: Approximately 1½ gal will cover 100 sq ft. Two coats are recommended by the manufacturer.

Manufacturer: Flexrock Company, Filbert and Cuthbert, Philadelphia 4, Pa.

For Protection and Looks

Name: Flintkote Binderseal and granules.

Type: A plastic adhesive composition made from selected asphalts for coating building walls prior to finishing with colored mineral granules.

APPLICATION

Method: Binderseal is applied by spray and, before the Binderseal can dry, the granules are applied by air hose, for decorative purposes.

The Control Center that OUTSMARTS ACCIDENTS

No longer is it necessary to expose personnel to "hot" buses or to sacrifice safety to gain accessibility to your control centers. Removal and replacement of Westinghouse Starter Units is safe and simple. "Magna-Grip" stab connectors simply "plug-in" to the power bus.

To work on the panel, starter unit may be withdrawn to a tilt-out disconnect position and locked. The unit is "dead" . . . completely disconnected from the power bus and self-supporting in this position. Protection is assured since it is impossible to reach around the starter unit and touch the bus.

For work on the bench, it is a simple matter to remove the complete starter unit. Note that the *unit door remains on the panel* so that it can be closed to guard the exposed bus. Rigid guide rails in the structure facilitate replacement of the starter unit. These rails align the starter and steer the "Magna-Grip" stab connectors into accurate contact with the power bus.

Westinghouse Control Centers offer still more points of safety.

For example:

Complete baffling to localize unusual arcing if faults occur.

Interrupting capacity of each starter not less than 15,000 rms amps.

Self-cooling construction for foolproof ventilation.

Sturdy structures that are self-supporting.

Get all the facts as presented in booklet B-4213 from Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna. J-27008

DESIGN TESTED AND VERIFIED IN THE Westinghouse HIGH POWER LABORATORY

Westinghouse

CONTROL CENTERS

Preparation of Surface: Masonry surfaces upon which Binderseal is applied must be free from grease, dust, dirt, loose mortar or paint. Surfaces must be completely dry. After the surface is cleaned, all joints and cracks are repointed or caulked and any void spaces patched. In the case of concrete buildings which have spalled over steel reinforcement, sandblasting is usually necessary to clean the rust from the steel prior to patching.

Priming: Any surface that can not be thoroughly cleaned, or which presents a residue of dust, or is excessively porous, should receive a prime coat of penetrating asphalt cutback to assure uniform bond for the application of the Binderseal.

Surfaces: Binderseal and granules are recommended for application over concrete and cinder block, monolithic concrete, cut or cast stone, hard burned brick and asbestos cement products. It is not recommended for use over magnesite stucco, soft brick, gypsum plaster, glazed terra cotta, wood, or galvanized iron.

PROTECTION

General: Designed to restore beauty as well as to protect and restore overall appearance of buildings or other structures. Will protect from weathering and usual industrial fumes.

Manufacturer: The Flintkote Co., Industrial Products Div., 30 Rockefeller Plaza, New York 20, N. Y.

With a Gilsonite Base

Name: Gilsonite Insul-Mastic Protective Coatings.

Type: Black mastic having a Gilsonite base and containing a large percentage of high quality mica flake.

APPLICATION

Method: Applied by spraying. Can be trowelled, but spraying is the generally accepted, faster and preferred method.

Equipment: A heavy duty spray gun having a ¼ in. nozzle. An air compressor having a 60 cu ft to 105 cu ft capacity. Material and air hoses. For steady, fast pumping of the material to the spray gun, manufacturer makes a special spraying machine having a material hopper and a high speed air motor.

Surface Preparation: Masonry surfaces must be dry and free from dust. If dusty, very porous, the surface should be first coated with Gilsonite Insul-Mastic Primer. Loose concrete and mortar must be removed. Concrete must then be patched and mortar joints either tuck pointed or filled with Gilsonite Insul-Mastic Caulking Compound by using a flow nozzle air gun or trowel.

Membraning: A woven glass fiber membrane is recommended for use over cracks, joints and angles. This should extend 4 in. on each side of the crack, joint or angle. Membrane is applied by pressing it into a thin tack coat of Insul-Mastic.

Angle of Surface: Gilsonite Insul-Mastic will adhere to a properly prepared surface at any angle including ceilings.

Thickness: Applied 1/16 in. to ⅛ in. depending upon severity of conditions.

Decoration: Gilsonite Insul-Mastic is black but, if desired, it may be attractively finished with Insul-Mastic Aluminum Spray; or in a number of colors available in an Insul-Mastic plastic coating; or by blowing colored stone granules into the protective coating while it is still wet.

Applicators: Manufacturer has licensed contractors in principal cities to apply its coatings. These contractors have trained engineers, crews and necessary equipment.

PROTECTION

Acids: Recommended for protection against most acids.

Alkalis: Recommended for protection against most alkalis.

Sun: Unaffected by the actinic rays of the sun.

Temperature Range: Minus 40 F. to plus 300 F. Rapid changes of temperature within this range will not harm the coating.

Water: Recommended for moisture-proofing. Will prevent the transmission of water and moisture if applied to the side of the masonry which will be exposed to the water.

Moisture Vapor: Moisture vapor transmission rate per 100 sq in. per ⅛ in. thickness per 24 hours is 0.01 grams.

Weathering: In accelerated weather tests in an accepted type of weather machine, Gilsonite Insul-Mastic has lasted the equivalent of over 50 yr.

Manufacturer: Insul-Mastic Corporation of America, Oliver Bldg., Pittsburgh 22, Pa.

Plastic Coating

Name: Insul-Mastic, Plastic Protective Coating.

Type: Vinyl plastic cut back by a solvent which, when dry, leaves a nonporous, durable plastic surface.

APPLICATION

Method: Applied by spraying or brushing.

Equipment: Standard paint spraying equipment or brush.

Surface Preparation: Masonry surface must be dry and free from dust and grease. New concrete should receive an acid wash to neutralize free alkalis.

Angle of Surface: Insul-Mastic Plastic will adhere to a properly prepared surface at any angle including ceilings.

Number of Coats: Two to four or more depending upon degree of protection needed and severity of conditions. Special types of plastic are used for the different coats.

Membraning: Has extremely high tensile strength and does not normally require membraning. However, where additional strengthening is desired over cracks and corners, membraning as specified for Gilsonite Insul-Mastic may be used. Press it into a tack coat of Insul-Mastic Plastic.

Applicators: Insul-Mastic has licensed contractors in principal cities to apply its coatings. These contractors have trained engineers, crews and necessary equipment.

Colors: Proven industrial shades of red, tile red, yellow, buff, dark green, light green, light blue, cream, light grey, dark grey, black, white and aluminum. Special colors can be matched.

PROTECTION

Acids: Highly resistant to spillage and fumes of nearly all acids except acetic, formic and hydrofluoric.

Alkalis: Highly resistant to spillage and fumes of nearly all alkalis.

Salts: Highly resistant to salts.

Oils: Insul-Mastic Plastic is impervious to oils which normally dissolve protective coatings.

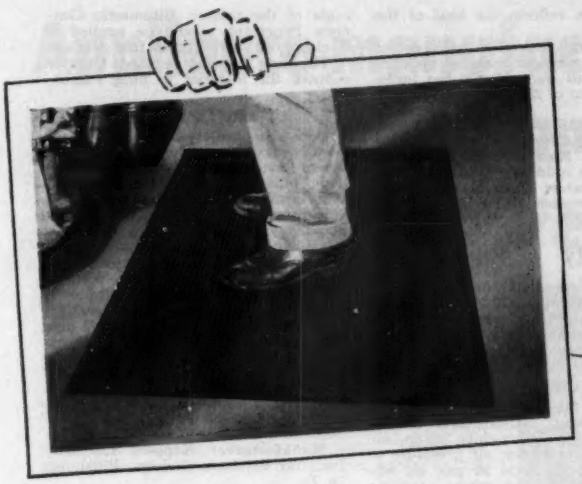
Alcohol: Impervious to alcohols except for the plastic coating designed for application over Gilsonite Insul-Mastic.

Water: May be used to line masonry water tanks or for constant immersion in water. Being a plastic the coating is as impervious to moisture as any other plastic.

Sanitation: Approved by boards of

Photo: Insul-Mastic Corporation of America

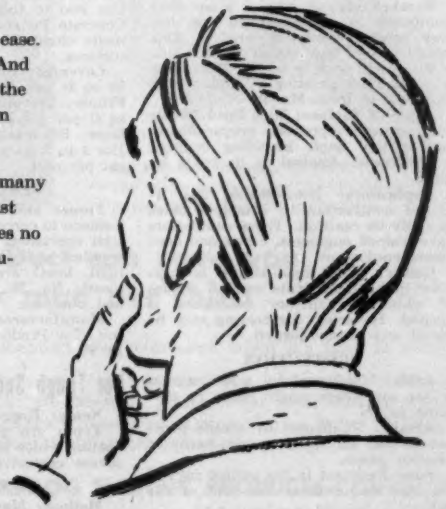
Workmen masking a section of masonry which is not to be coated, while a painter sprays on a white mastic to preserve and protect masonry exterior



"This resilient mat is easy on the feet... yet takes the toughest treatment."

"Getting kicked around is everyday routine for this neoprene standing mat. But it can take the worst scuffing and cutting from heavy work shoes or sharp metal scrap because of neoprene's outstanding resistance to abrasion. The mat's resilient ribs can support a man's weight with foot-saving ease. Still they're flexible enough to scrape grime off his shoes. And even oil splattered from operating machinery won't cause the mat to go to pieces. For neoprene resists deterioration from grease, oil and heat—won't get soft or sticky with age."

This ribbed standing mat is just one more example of the many fine rubber products that give more efficient service and last longer because they're made with neoprene. Du Pont makes no finished products of neoprene, but your rubber goods manufacturer or distributor will be glad to tell you about the neoprene products he supplies.



Tune in "Cavalcade of America," Tuesday nights—NBC coast to coast

NEOPRENE

The rubber made by Du Pont since 1932

DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

FREE! **The Neoprene Notebook**

Interesting stories . . . new, unusual applications and products of neoprene. Write E. I. du Pont de Nemours & Co. (Inc.), Rubber Chemicals Division M-4, Wilmington 98, Delaware.

health for use in direct contact with foods.

Weathering: A life many years beyond that of paint may be obtained in the severest outside weather.

Temperature: Up to 150 F.

Cleaning: Non-porous, does not absorb dirt, can be washed clean like glass. None of the coating is removed by the cleaning.

Manufacturer: Insul-Mastic Corporation of America, Oliver Bldg., Pittsburgh 22, Pa.

White Coating

Name: Mica Insul-Mastic Protective Coating.

Type: White mastic coating having a base of highly penetrating and sealing fish oils and containing a large percentage of high quality mica flake.

APPLICATION

Method: Applied by spraying. Can be trowelled, but spraying is the generally accepted, faster and preferred method.

Equipment: A heavy duty spray gun having a ¼ in. nozzle. An air compressor having a 60 cu ft to 105 cu ft capacity. Material and air hoses. For steady, fast pumping of the material to the spray gun, company manufactures a special spraying machine having a material hopper and a high speed air motor.

Surface Preparation: Masonry surfaces must be dry and free from dust. If dusty, very porous, or of new concrete or mortar the surface should be first coated with either Mica Penetrating Primer or Insul-Mastic Sealcoat Primer. Loose concrete, stucco and mortar must be removed. Concrete or stucco must be patched and mortar joints pointed.

Membraning: A woven glass fiber membrane is recommended for use over cracks, joints or angles. This should extend four inches on each side of the crack, joint or angle. Membrane is applied by pressing it into a thin tack coat of Insul-Mastic.

Angle of Surface: Mica Insul-Mastic will adhere to a properly prepared surface at any angle including ceilings.

Thickness: Applied 1/32 in. to ⅛ in. thick.

Applicators: Insul-Mastic has licensed contractors in principal cities to apply its coatings. These contractors have trained engineers, crews and necessary equipment.

Colors: Mica Insul-Mastic is supplied in brilliant white and off shades of white. No further decoration is needed. However, the coating may be tinted any shade desired.

PROTECTION

Acids: Unaffected by acids present in the air which might harm or discolor paints.

Alkalis: Unaffected by alkalis present in the air which might harm or discolor paints.

Sun: Resistant to the actinic rays of the sun, and reflects the heat of the sun.

Temperature: Minus 20 F to plus 180 F.

Water: Recommended for moisture-proofing. Will prevent the transmission of water and moisture if applied to the side of the masonry which will be exposed to rain, snow, sleet.

Insulation: A comfortable degree of reflective insulation is obtained by the brilliant whiteness of white Mica Insul-Mastic which reflects the heat of the sun.

Weathering: In accelerated weather tests in an accepted type of weather machine, Mica Insul-Mastic has lasted the equivalent of 25 years without signs of failure.

Fire: Highly fire resistant. Will not support combustion after drying.

Cleaning: Mica Insul-Mastic can be cleaned with mild soap and water.

Manufacturer: Insul-Mastic Corporation of America, Oliver Bldg., Pittsburgh 22, Pa.

For Ductility

Name: Kopper's Bituplastic No. 28.

Type: The various ingredients in Bituplastic No. 28 are formulated, combined and treated by a process which produces a protective material of lasting ductility.

APPLICATION

Method: May be applied either by brush or spray. Manufacturer recommends using a heavy-duty pump, air pressure, 50 to 90 psi; air pressure at pump for fluid, 35 to 90 psi; air adjusted at the gun for proper atomization.

Number of Coats: Two or more coats should be applied to obtain thorough coverage.

Thinners: Thinning of Bituplastic No. 28 is not recommended. When absolutely necessary use a very small amount of clean, cold water as a thinner.

Primer: No primer is required on well-bonded old protective coatings where spot tests show compatibility between the former coating and Bituplastic No. 28. Prime with one coat of Bituplastic Primer for low porosity concrete, masonry, brick and insulation. Use two to three coats of Bituplastic Concrete Penetrant to prime high porosity cinder block and other masonry surfaces.

Coverage: Bituplastic No. 28: 50 to 60 sq ft per gal per coat. Bituplastic Primer: Use one even coat around 400 sq ft per gal on rough or porous surfaces. Bitumastic Concrete Penetrant: Use 2 to 3 coats at 150 to 200 sq ft per gal per coat.

PROTECTION

Fumes and Weathering: High resistance to corrosive fumes from industrial operations and high resistance to weather and climate (rain, snow, sunlight, heat) are obtained with Bituplastic No. 28. May be used indoors and outdoors.

Manufacturer: Koppers Company, Inc., Tar Products Division, Pittsburgh 19, Pa.

For Tough Service

Name: Koppers' Bitumastic No. 50.

Type: An extra heavy bitumastic coating which is designed for unusually severe corrosive conditions.

APPLICATION

Method: May be applied either by brush or spray. For spraying, the manufacturer recommends a heavy-duty pump having an air-nozzle pressure conversion ratio of at least 5 to 1. Minimum requirements when using a heavy duty pump: air pressure, 50 to 90 psi; air pressure at pump for fluid, 35 to 90 psi.

Surface Preparation: For concrete and other porous surfaces: one to two coats of the primer, Bitumastic Concrete Penetrant, should be applied to a clean, oil and grease-free surface.

Thinner: None to be used. Stirring reduces the material to fluid consistency.

PROTECTION

Corrosive Atmospheres: Bitumastic No. 50 was specially designed to protect where conditions of corrosive fumes and similar rugged service are found. It is formulated and processed to provide properties which permit easy application of thick protective films even on vertical surfaces, without sagging.

Water: The basic, vital essential of any good corrosion protective material is its ability to prevent the entrance of water or water vapor. The big-molecule masses of Bitumastic No. 50 provide an impervious barrier to the passage of water and thus eliminate the conditions that help speed action of corrosive chemicals.

Service Temperature Limits: Minus 10 F to plus 160 F dry heat; 110 F maximum under water.

Manufacturer: Koppers Company, Inc., Tar Products Division, Pittsburgh 19, Pa.

Insulator, Protector

Name: Mortell's No-Drip.

Type: A triple-duty, insulation-type coating which protects concrete and other masonry, and wood, by isolating it from the attacks of moisture.

APPLICATION

Method: This substance may be applied by brushing, troweling, spraying or by hand (when small areas are to be covered). When it is applied by spray the material pressure should be 70 to 100 psi and the air pressure on material hose 125 psi. Air supply should be at the rate of at least 25 cfm.

Surface Preparation: No-drip adheres readily to any surface provided it is clean and dry. It is necessary to remove all oil, grease, dust and moisture.

Coverage: A gallon will generally give a wet coating ¼ in. thick covering 6 sq ft of rounded, flat or irregular surface. The governing factor on thickness, however, is the condition to be overcome by the No-Drip. This may vary the thickness from ⅛ to ½ in.

Coats: Two coats are recommended. Applied about ⅛ in. at a time, this will give from 90 to 100 per cent protection.

PROTECTION

Resistance: Acting as a moisture-proof insulation, No-Drip prevents rotting and disintegration of the covered substance by keeping moisture away from the wood or masonry surface. Further, it acts as a thermal insulation.

Manufacturer: J. W. Mortell Company, 537 Birch St., Kankakee, Ill.

With a Rubber Base

Name: Pittsburgh's 300 Line.

Type: A chlorinated, rubber-based protective coating.

APPLICATION

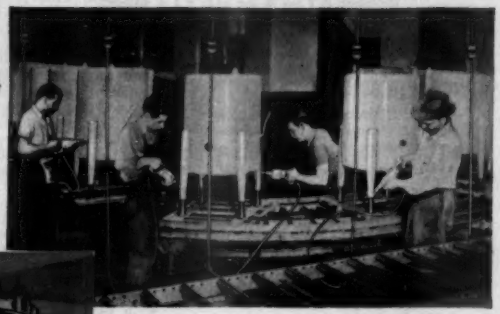
Method: The 300 line of coatings may be applied either by brush or spray.

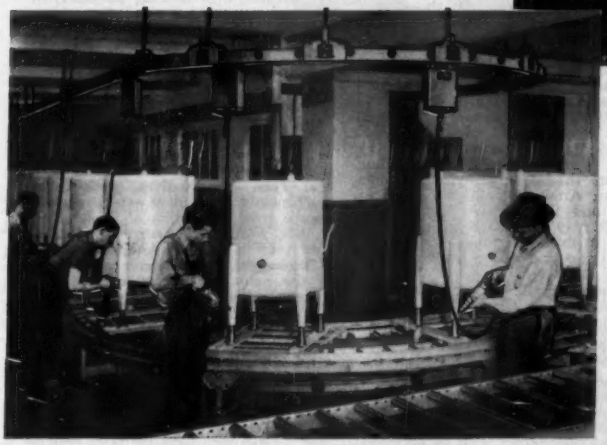
Preparation of Surface: Briefly, a high grade cleaning job is necessary. All dust and loose dirt must be removed from surfaces and oil or grease removed or neutralized. The 300 line

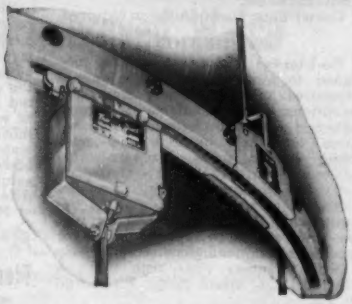
Appliance manufacturer steps up production with *mobile power system*

BEFORE—Long, entangling extension cords from old-fashioned, stationary outlets wasted valuable time, jeopardized workers' safety.

AFTER—Trolleys move with the job, transmitting "on-the-spot" power. Some manufacturers report BullDog Industrial Trol-E-Duct saves as much as 30 minutes per man per shift.







Put this slot to work for you! It's the only answer to profitable power for modern assembly lines.

BullDog Industrial Trol-E-Duct can save you up to 30 minutes per man per shift!

PUT EXTRA profit in your production line with flexible, efficient BullDog Industrial Trol-E-Duct.

This revolutionary system carries current by copper bus bars encased in insulated steel duct. Trolleys, pulled along the continuous slot in the bottom of the duct, transmit power from bus bars to portable electrical tools, cranes, hoists and other moving "loads."

Awkward extension cords are eliminated. An eight-ounce pull moves power with the job. Workers can tap off power at any point along an Industrial Trol-E-Duct run.

And this modern system is just as flexible in meeting installation changes as it is in use. Every inch of Industrial Trol-E-Duct is salvable and can be quickly dismantled and reinstalled when it's time to move.

Yes, you can solve many a production headache with "on-the-spot" power. Your local BullDog Field Engineer will be glad to show you an Industrial Trol-E-Duct installation near your own plant any time.

BULLDOG ELECTRIC PRODUCTS COMPANY

DETROIT 32, MICHIGAN • FIELD OFFICES IN ALL PRINCIPAL CITIES

IN CANADA: BULLDOG ELECTRIC PRODUCTS OF CANADA, LTD., TORONTO

BULLDOG

PIONEERS IN FLEXIBLE ELECTRICAL DISTRIBUTION SYSTEMS

can be applied over existing old paint if the coating is in good condition and adhering well to the base surface.

Coverage: 300 to 400 sq ft per gallon at 1 mil. thickness.

PROTECTION

Resistance: This line of maintenance coatings has a wide range of usefulness. It is unaffected by fumes of mild spillage of most acids, alkalies or salts. It is easy to apply, has a good range of colors. The line was specially designed for all-around maintenance use in interiors subjected to corrosive attack. The resistive qualities of the coating are unaffected by new plaster or new concrete.

Manufacturer: Pittsburgh Coke & Chemical Co., Grant Building, Pittsburgh 19, Pa.

A Vinyl Protector

Name: Pittsburgh's 401 System.

Type: A vinyl system—wash type reactive primer.

APPLICATION

Method: May be applied either by brush or spray.

Preparation of Surface: Sandblasting is preferred in order to remove all accumulations of dirt. Power brush is acceptable, however, under less severe exposure conditions.

Coverage: 200 to 300 sq ft per gallon; 1 mil. thickness.

Coats: Four coats minimum required.

PROTECTION

Resistance: This coating was designed to meet extreme maintenance exposures, as well as many immersion conditions. It is unaffected by most salts and alkalies at moderate temperatures, and most mineral type acids within certain limits of concentration and temperature. It is not recommended for esters, ketones, bromines, iodines, aldehydes (except formaldehyde), organic acids (except lactic and formic). See the company representative for specific recommendations.

Manufacturer: Pittsburgh Coke & Chemical Co., Grant Bldg., Pittsburgh 19, Pa.

Quick-Setting Coating

Name: Pittsburgh Cementhide Structural Paint.

Type: Scientifically designed synthetic coating.

APPLICATION

Method: May be applied by brushing, or may be sprayed if desired. Any adjustment in the consistency of the Cementhide finish coat may be made with either Leptyne or turpentine.

Preparation of Surface: Any and all grease and loose dirt should be removed from surface by accepted methods. Acid etching is recommended for all unpainted cement prior to finishing. A solution of muriatic acid, made by diluting one part of concentrated acid with three parts of water, should be used for etching.

Drying: Sets quickly, depending on temperature and weather conditions; this quick drying reduces weather hazards during the initial drying and tack-free film resists initial dirt collection.

Brick Buildings: Brick structures, while less susceptible to weather effects, still very often require protection for economic purposes. At times, trapped moisture frozen into the body of a structure causes disintegration at the mortar joints. After the joints are properly repaired, Cementhide Brick and Stucco Paint is applied to prevent further disintegration.

PROTECTION

Weathering: Designed primarily for use to combat the weathering effects which set in as soon as a structure of concrete or brick is erected. The low sheen of Pittsburgh Cementhide Structural Paint minimizes surface irregularities and provides greater resistance to dirt collection.

FLOORING

Cement Floors: Cement floors present a special problem and require unusual preparation in order to realize satisfactory results. Acid etching is recommended for all unpainted cement prior to finishing. By etching, the adhesion of paint coats is greatly improved, and alkalies which have a destructive action on paint films are neutralized to a great extent. (For details on acid etching mixture, see above.) Use a wooden bucket or enameled pail and a stiff fiber brush. Apply 1 gal of solution to 100 sq ft of floor and scrub well while applying. Allow solution to remain on floor till it stops bubbling, then flush off thoroughly with clean water. If surface does not dry in a few hours it should be flushed again. When surface is dry, proceed with painting.

Old, worn painted cement floors may be etched as readily as unpainted cement. When the condition of the floor is such that removal of old paint is advisable this may be accomplished by the use of an alkali solution containing not more than 1 lb of lye to 5 pints of water. After the paint has been removed and the surface flushed with water it may be etched with acid, as above. In this case, however, 1 gal of solution should be used on 75 sq ft of floor.

Manufacturer: Pittsburgh Plate Glass Co., 632 Dequesne Way, Pittsburgh 22, Pa.

Floor Sealing

Name: Tremco Penetrem.

Type: A floor sealing compound which permeates the fibrous cell structure, reinforces the cell walls and toughens the surface with an abrasion-resistant film.

APPLICATION

Method: This clear, amber colored liquid should be applied in thin, even coats with a brush.

PROTECTION

Moisture: The porosity of wood and its limited resistance to wear, because of its fibrous cell structure, creates serious problems. Scrubbing floors repeatedly, or subjecting them to solutions of chemicals, softens and deteriorates the cell structures and aggravates these problems. The best way to protect them is to treat them with a seal like Penetrem. By filling the pores, the floor seal keeps out dirt, grime and other foreign matter. Even old, oil-stained wood floors can be made tough and wear-resistant provided the oils have been removed from the floor. Penetrem also eliminates the musty odor and rotting of wood which goes hand-in-hand with the scrubbing and water soaking. Splintering of wood is also reduced by the action of Penetrem.

Caustic: Penetrem treated floors are resistant to caustic in dilute concentrations and to soapy solutions.

Manufacturer: Tremco Manufacturing Co., 8701 Kinsman Rd., Cleveland, Ohio.

You Can See Through Them

Name: Three types of transparent masonry preservatives: Tremco 141 Masonry Preservative (invisible); Tremco 143 Masonry Preservative (transparent); and Tremco 145 Masonry Preservative (clear).

Types: All of them for use where a high degree of protection is desired with a minimum of alteration or discoloration of the masonry.

APPLICATION

Method: Tremco 141 and 143 may be applied either with brush or spray. Tremco 145 should be applied by brush.

Surface Preparation: Surface to be coated should be free of all dirt and cleansed of oil or grease.

PROTECTION

Moisture: When water is absorbed into masonry, dirt is drawn deeply into every pore. Damp stone is much more likely to hold soot and dirt than is a dry surface, thus making discoloration quicker and more severe. But, when exterior surfaces are sealed with a clear masonry preservative, the absorption of water into the porous structure of masonry is retarded. Thus, the dirt stays on the surface and a subsequent rain can wash away the dirt.

Spalling: These three different transparent masonry preservatives are made to overcome a variation of conditions in different types of materials. In general, such preservatives prevent the spalling and chipping of exteriors which results from the action of frost which, in turn, is due to the entrance of moisture into the joints of the material.

Tremco 141: Where no alteration of the color or texture of such fine materials as light colored marbles, granites, art stone, is permitted, Tremco 141 is recommended.

Tremco 143: This has been developed for use where a slight darkening of the surface is not objectionable in view of the need for a longer-lived treatment. It does not, however, alter the appearance or texture of the surface except that light material such as limestone, sandstone, light marble or light terra cotta are moderately darkened.

Tremco 145: The surfaces to which this preservative is applied will be only perceptibly affected, regardless of light hue of the surface. The treatment possesses no more color than water, and the only apparent darkening results from the wetting action of the compound. It retains its colorless appearance indefinitely.

Manufacturer: The Tremco Manufacturing Co., 8701 Kinsman Rd., Cleveland, Ohio.

Resistant to Free Lime

Name: Tremco Mfg. Co.'s Cemcol.

Type: A specially formulated oil paint made with a treated oil that is highly resistant to the free lime which is present in concrete.

APPLICATION

Method: May be applied by spraying or by brush.

(Continued on page 99)

it's New! it's Different!

it's the strongest pipe wrench in the world!

–the revolutionary Walworth improved Walco®

Yes, this is it . . . the NEW Walworth *Improved* Walco pipe wrench–with every part scientifically designed and tested by engineers for strength, safety and ease of operation. Its instant bite, and accurately determined center of gravity, combine with its inherent strength and minimum of weight to make it the fastest-working, easiest-handling, best balanced, heavy-duty pipe wrench available today . . . a wrench specially designed to minimize operator fatigue.

All parts are made of forged steel. The housing and handle are projection welded–a structural weld–to form an integral unit. Both jaws are carefully machined, and all parts are heat-treated to give extra toughness, uniformity, and strength. Every Improved Walco far exceeds the requirements for Federal Specification GGG-W-651a for Type II Heavy Duty Adjustable Pipe Wrenches.

A flexible, double-acting, easily replaceable spring–an exclusive patented Improved Walco feature–gives the wrench fast, positive ratcheting action!

Ask your Walworth distributor about the new, Improved Walco today! Heft the new, Improved Walco . . . feel its perfect balance–every part is guaranteed by the Walworth Company, doing business since 1842.

Check these outstanding features

LIGHTER: Housing and Handle are projection welded to form one integral unit.

CORRECT BALANCE: Accurate, the correct location of the center of gravity determined by test.

STRONGER: Heat treated to eliminate brittleness . . . cracking.

FAST ACTING: Scientifically designed spring action insures positive ratcheting action . . . quick bite.

CALIBRATED PIPE SCALE: Built-in scale permits speedy adjustment to pipe size.

RENEWABLE PARTS: All parts are readily obtainable, and easily replaced without special tools; thus prolonging service life indefinitely.

RUST RESISTANT FINISH: Entire wrench is rust resistant — Nut and Jaws have a special electroplated zinc coating.

WALWORTH

valves...fittings...pipe wrenches

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

ACCO Registered Wire Rope Slings

The Safest . . . The neat wrapping of strands around the rope, and the steel sleeve locked over the wire ends, prevents snagging. DUALOC can be grasped by bare hands. And, it is always "open" for inspection. You can see that the ending is safe to use. DUALOC *is the safest wire rope ending.*

The Surest . . . The DUALOC loop is made of wire rope that has not been unlaid and relaid. It is undisturbed, undistorted. Only the end of the rope is opened. All the strength of the wire rope is there to assure full capacity. DUALOC *is the surest ending.*

The Most Efficient . . . DUALOC is 100% efficient. The ending will outlast the wire rope. Because there is no distortion in ACCO *Registered* WIRE ROPE SLINGS, the wire rope will develop its full catalog breaking strength. This means that frequently smaller diameter rope can be used resulting in lower original sling cost. DUALOC *is the most efficient.*

Added Values . . .

Rated capacities based on 5 to 1 safety factor
Proof-tested at twice the rated capacity
Registered to assure satisfactory service

Standard unit ACCO *Registered* WIRE ROPE SLINGS, made from preformed wire rope, are stocked by leading distributors who will gladly discuss your sling problems. Custom-made slings on special order. Write today for literature.

MEMBER THE NATIONAL SAFETY COUNCIL

Strand-Laid

Made from right regular lay wire rope for general sling use. Equipped with **DUALOC.**

Cable-Laid

Made by laying up seven individual wire ropes. Gives extreme flexibility. Equipped with **DUALOC.**

Other ACCO Registered Wire Rope Slings

6-Part Braided. Made from 6 separate wire ropes braided into flat surfaces for greater bearing area.

8-Part Braided. This construction has a symmetrical body which gives all-around flexibility plus great strength.

ACCO Wilkes-Barre, Pa., Chicago, Denver, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

AMERICAN CHAIN & CABLE
WIRE ROPE SLING DEPARTMENT

Made by the Originators of *Preformed* WIRE ROPE

TRADE MARK

In Business for Your Safety

IN FLOW CONTROL EQUIPMENT,

the BEST *is not too good for you*

Why not take advantage of Powell "know-how" in design, workmanship, and *use of materials?*

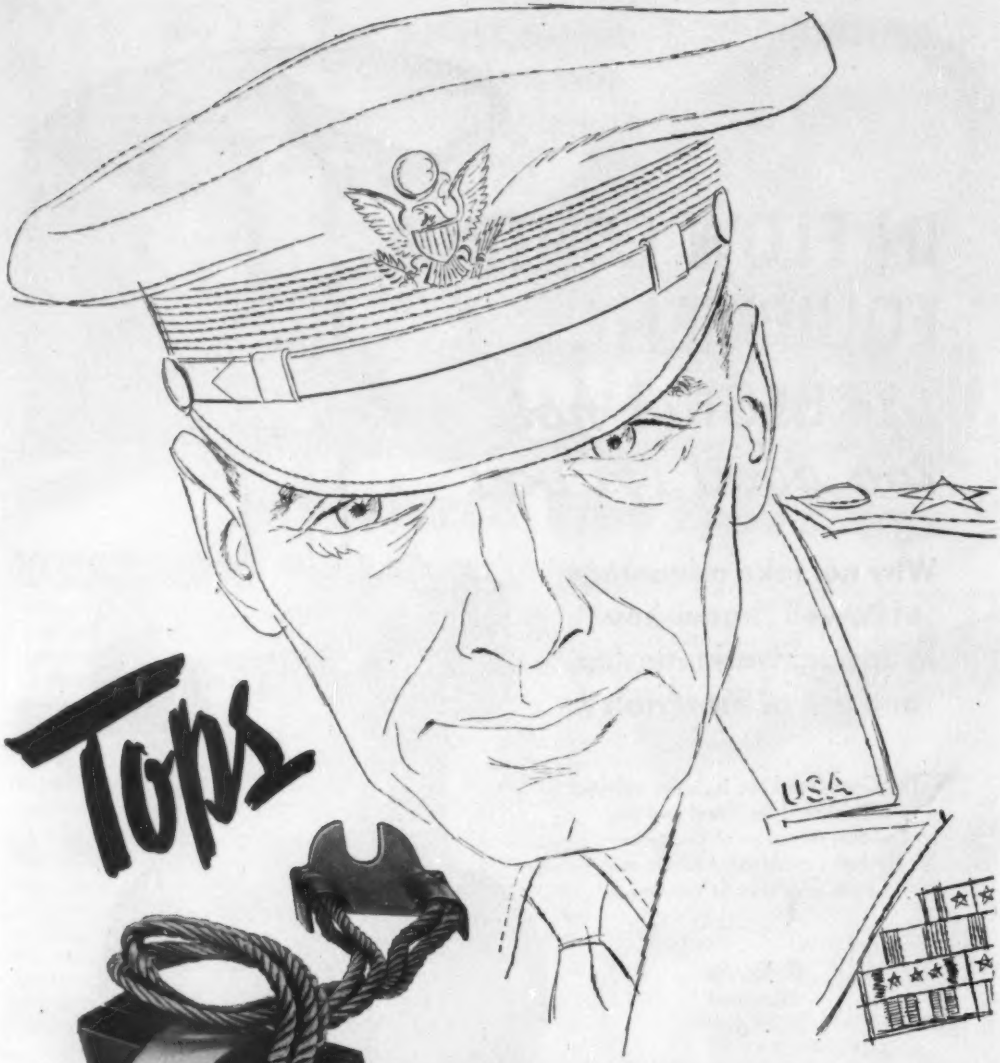
The Complete Line includes valves in Bronze, Iron, Steel and the widest selection of Corrosion-Resisting metals and alloys ever made available to Industry.

Quality line throughout "The Line"

Fig. 3003 W. E.—Class 300-pound Cast Steel O. S. & Y. Gate Valve with welding ends for Power Plant Installations.

POWELL

The WM. POWELL CO., 2525 Spring Grove Ave., P. O. Box 106, Station B, Cincinnati 22, Ohio



Tops

U. S. PAT. 2,181,876

LIKE SPEER MULTIFLEX BRUSHES

For high stability in operation

SPEER Carbon CO.

ST. MARYS, PENNSYLVANIA

Subsidiaries

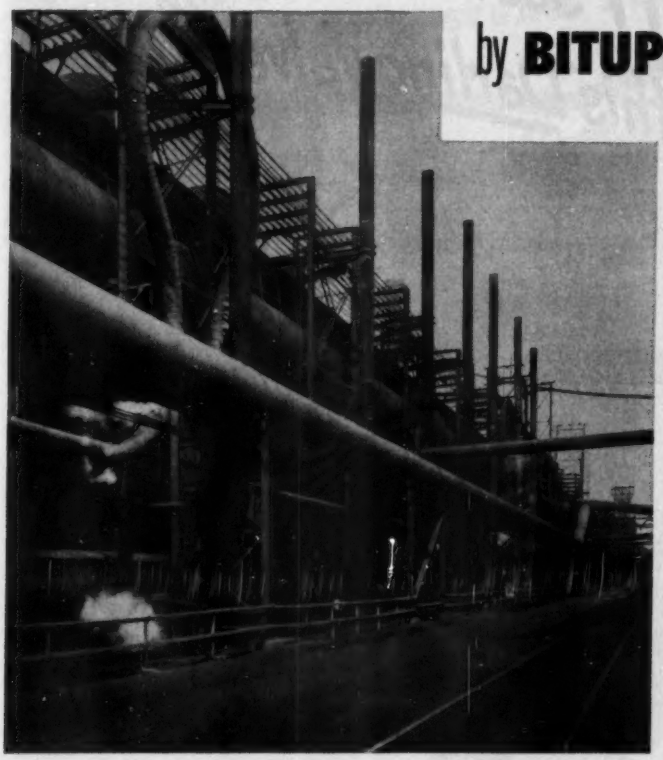
Speer Resistor Corp.—International Graphite & Electrode Corp.

Jeffers Electronics, Inc.

7365

Large Steel Plant Protected Against Corrosion

by BITUPLASTIC® No. 28



SEVERE corrosive atmospheres around these big blast furnaces are a challenge to *any* protective coating. Bituplastic No. 28, a heavy-duty Koppers Coating, has met this challenge . . . with plenty to spare.

Here's one of the reasons: each coat of Bituplastic No. 28 protects metal with a thick, tough film—a film that is *five to eight times thicker* than conventional protective coatings. This extra-thick, extra-tough barrier against corrosion provides better protection, lasts longer, and costs far less to maintain.

Bituplastic No. 28 is one of Koppers complete family of Bitumastic® Industrial Protective Coatings—specially formulated to control specific kinds of corrosion. Send for a set of our free booklets. They show how Koppers Coatings can cut *your* corrosion losses.

Here's why Bitumastic Coatings give *lasting* protection against corrosion and deterioration of *metal, masonry and concrete.*

- **Koppers Coatings, unlike maintenance paints, are specially formulated from a tar-pitch base* that is, for all practical purposes, impervious to water.**
- **Koppers Coatings provide a tough, impenetrable barrier to corrosive elements.**
- **Koppers Coatings provide up to 8 times the film thickness of conventional paint coatings.**
- **Koppers Coatings stop corrosion caused by moisture . . . acid fumes . . . alkaline fumes . . . corrosive soil . . . salt air . . . heat.**

**Hi-Heat Gray contains heat-resistant metallic base*

Koppers Company, Inc.
Tar Products Division, Dept. 423T
Pittsburgh 19, Pa.

Please send me without charge or obligation your booklets on corrosion prevention.

Name.....

Address.....

City.....Zone....State.....

KOPPERS **BITUMASTIC** PROTECTIVE COATINGS

REG. U.S. PAT. OFF.

SOLD THROUGH INDUSTRIAL DISTRIBUTORS

KOPPERS COMPANY, INC., Tar Products Division, Dept. 323T, Pittsburgh 19, Pa.

WHY seat misalignment doesn't cause this Darling Valve to leak!

NO gate valve body ever made is entirely immune to distortion caused by line stresses and temperature changes. Yet even slight distortion can throw the seats out of alignment—probably the most common cause of leaky valves and costly replacement.

That's one reason why Darling gate valves, with their unique wedging principle combined with fully revolving double discs and parallel seats, have the jump on other valves. They easily, *automatically* adjust for valve body distortion, cinching tight, leak-proof closure without destructive strong-arm tactics. Most important, you avoid costly down-time and repeated maintenance headaches.

But that's not all! Actually, this Darling principle offers several other equally important time-and-money-saving advantages. In plant after plant they add up to trouble-free performance and longer service life with a very minimum of attention.

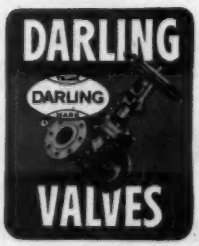
GET ALL THE FACTS

Send for descriptive cast steel valve Bulletin No. 5003.

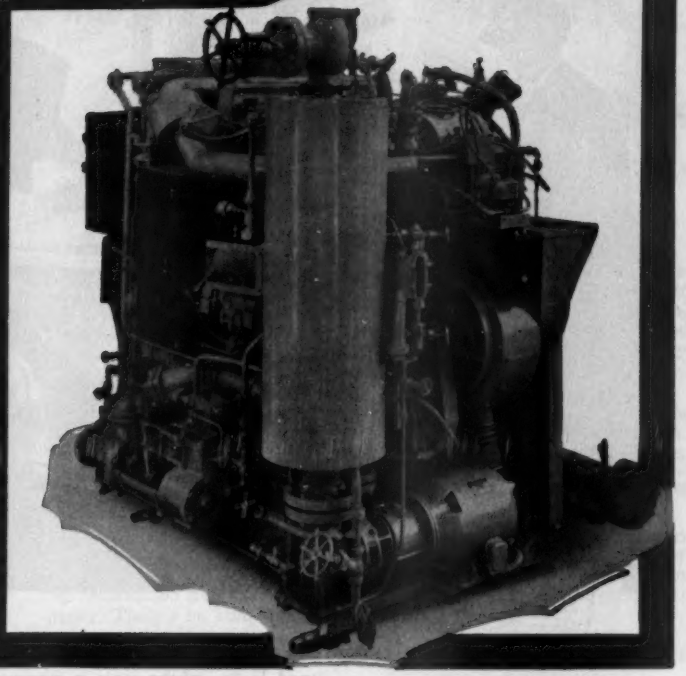
DARLING VALVE & Manufacturing Co.
WILLIAMSPORT 17, PA.

NOTE: *Darling gate valves are made in a wide range of sizes, types and constructions, including solid and slotted taper-seat wedge types, for all kinds of normal and corrosive services in pressures up to 1500 pounds.*

FOR PLUS VALUES, JOB-PROVED AGAIN AND AGAIN



Not a Package Boiler—but a PACKAGED STEAM PLANT



Do you need steam . . .

. . . for heating, processing or both—in unit capacities up to 6,000 pounds per hour—for pressure up to 300 psi?

. . . in remote locations involving the expense of installing and maintaining long insulated pipe lines?

. . . for intermittent requirements—a few hours each day or week?

. . . for an occasional load which may exceed the capacity of existing boilers?

. . . for a highly fluctuating load which involves sudden heavy demands?

. . . with completely automatic operation; with a minimum of attention necessary?

. . . at maximum output from minimum space?

If you do—if you have any one or a combination of these requirements—your best bet is the C-E Re-circulation Steam Generator . . . more than a package boiler . . . a complete steam plant, including all controls and auxiliaries in a fully integrated unit. Send for bulletin p-323.

B-458

C-E

COMBUSTION ENGINEERING—SUPERHEATER, INC.

200 Madison Avenue, New York 16, N. Y.

ALL TYPES OF BOILERS, FURNACES, PULVERIZED FUEL SYSTEMS AND STOKERS; ALSO SUPERHEATERS, ECONOMIZERS AND AIR HEATERS

LET THESE EXPERTS make a "Roof Survey Report" for you. Ask about this free service.

The Built-Up Roof Survey tells exactly what condition your roof is in, gives you a permanent record, helps you plan ahead for roofing maintenance. Yours for the asking!

TAKE ADVANTAGE of this *free* Johns-Manville service to find out the exact condition of your built-up roof. It will enable you to make plans *now* for repairs and maintenance in the future.

That's what plant engineers and maintenance executives *like* about the J-M Roof Survey Plan.

Don't take *your* roof for granted, even though it doesn't *seem* to be leaking. Many a roof with torn flashings, dried-out felts, even rotted decks has been *assumed* to be in "good condition." The Roof Survey Report will cover all the critical areas . . . flashings, deck, roofing felts, parapet walls, skylights, etc. It will be an accurate picture by a roofing *expert*—the J-M Approved Built-Up Roofing Contractor. And it will cost you only the trouble of *asking* for it.

Let us send you the interesting booklet, "Things You Should Know About Your Roof." It gives complete information about the *free* J-M Roof Survey Plan, together with the full story of the J-M Flexstone* Asbestos Roof and the Asbestile* Flashing System. Write Johns-Manville, Box 158, Dept. PE, N.Y.16, N.Y.

Mail your Request today

Johns-Manville, Box 158,
Dept. PE, New York 16, N. Y.

Please have one of your Approved Built-Up Roofing Contractors see us about making a free survey of our roof.

Name_____

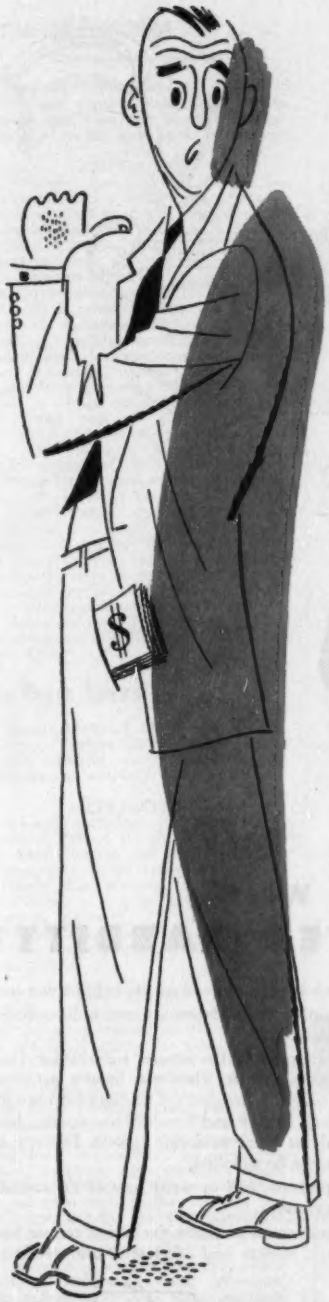
Address_____

_____

*Reg. U. S. Pat. Off.

Johns-Manville FLEXSTONE* Built-Up Roofs

ASBESTOS CORRUGATED TRANSITE* • ACOUSTICAL CEILINGS • DECORATIVE FLOORS • MOVABLE WALLS • ETC.



WHO, ME, A PRESSURE SPENDTHRIFT?

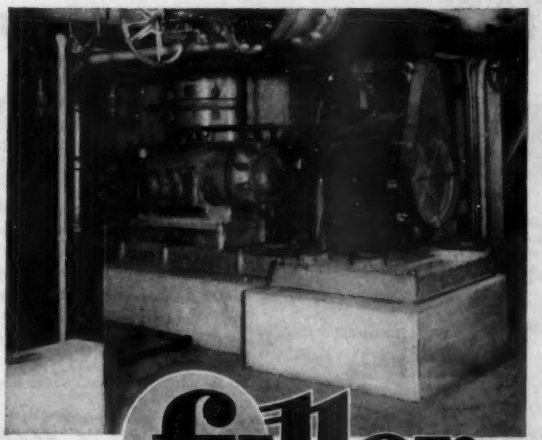
Let FULLER ROTARY COMPRESSORS supply just the pressure you need . . . WHERE you need it.

Sure, you need large, high pressure units to supply pressures equal to the demands of certain operations. But it costs plenty to compress air for these uses . . . and then have to reduce pressure from 10 to 50 lb. for some other task. That's why more and more plants throughout the country have adopted the economical plan of "spotting" Fuller Rotary Compressors wherever air is needed . . . at pressures up to 125 psig . . . supplying *only* the pressure required for most efficient work.

Fuller Rotary Compressors have few moving parts . . . the rotor, bearings and blades. They're fully dependable . . . need only infrequent inspection. There are no valves to leak or seats to grind. They're readily accessible. Blades automatically compensate for wear. ***Full capacity is maintained for the life of the machine.*** They're engineered for a full life-time of new machine efficiency.

If you're interested in dependable, more economical operation, get in touch with a Fuller engineer. He'll show you how you can be sure of getting just the pressure you want, where you want it . . . how you can cut installation and maintenance costs while you boost operating efficiency. There's no obligation, of course.

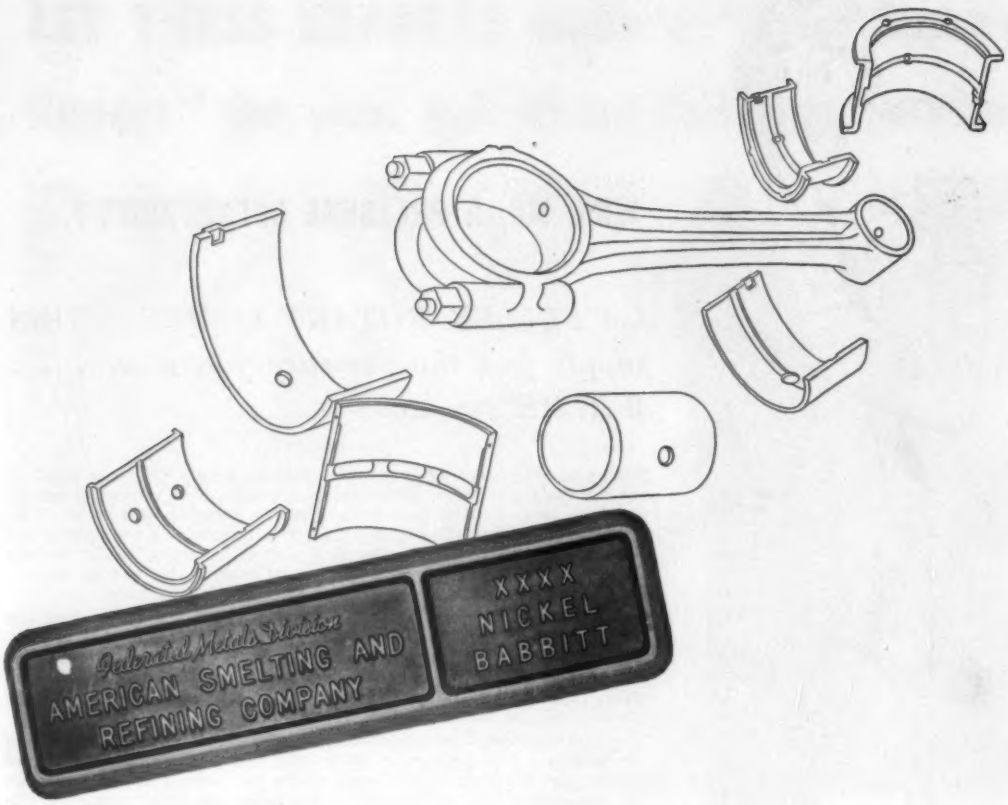
FULLER COMPANY, Catasauqua, Pa. • 120 S. LaSalle St., Chicago 3 • 420 Chancery Bldg., San Francisco 4



DRY MATERIAL CONVEYING SYSTEMS AND COOLERS
COMPRESSORS AND VACUUM PUMPS
FEEDERS, AND ASSOCIATED EQUIPMENT

fuller

C-197



to be sure

RE-LINE BEARINGS WITH FEDERATED BABBITT!

In all bearing maintenance work, the job is only as good as the babbitt you use.

By using Federated® babbitts you minimize maintenance costs, reduce down-time, and increase overall production efficiency.

From its complete line Federated can provide the proper babbitt for *your* particular job . . . also expert technical assistance when you have a problem. XXXX Nickel® and Thermodyne® are tough, dense-grained tin-base babbitts for heavy bearing loads at high speeds; Merit Metal® and Record® are ductile, low-cost lead-base babbitts for lighter loads at more moderate speeds. For special requirements, alloys of any composition can be supplied.

To order, or to obtain further information, call or write any of Federated's 12 plants and 22 sales offices across the country.

See Federated first, too, for other non-ferrous products, including copper-base alloys, aluminum and magnesium alloys, solders and fabricated lead products.

Federated Metals Division

AMERICAN SMELTING AND REFINING COMPANY • 120 BROADWAY, NEW YORK 5, N. Y.

Corrosion Prevention

(Continued from page 88)

Surface Preparation: All grease, oil and other contaminants must be removed and loose dirt brushed or vacuumed from the surface to be painted.

PROTECTION

Moisture: Besides being a water repellent, Cemcol's dual function includes the beautification of most masonry surfaces whether they are new or old, including concrete, stucco, stone, brick, concrete block, cinder block, unglazed tile, asbestos cement board, and asbestos cement shingles. By protecting the surfaces of masonry from the absorption of moisture, Cemcol prevents spalling, crazing, cracking, chipping, and general deterioration. Being more than just an oil paint, Cemcol allows water vapor migrating through masonry walls to escape through its "breathing film" and prevents blistering, peeling and scaling of the protective coating. This ability to "breathe" is especially important when the exterior walls of buildings with humid interior atmospheres must be treated.

Finish: Cemcol dries to a soft, flat finish and, as a result, masonry surfaces retain their original texture. By "washing" itself in every rain, Cemcol has the ability to retain its beauty over a considerable period. Dirt retention is cut to an absolute minimum.

Manufacturer: The Tremco Manufacturing Co., 8701 Kinsman Rd., Cleveland, Ohio.

Ten Times Thicker

Name: Tremco's 101 Mastic.

Type: Tremco 101 Mastic is a heavy mastic material, about ten times the thickness of ordinary paint.

APPLICATION

Method: Although the spray application of Tremco 101 Mastic is probably the most effective and economical way to coat large areas (often costing less to apply than it costs to plaster the same area) it can be applied with a brush or a trowel.

Surface Preparation: Surface should be free and clean of oil, grease and loose dirt.

PROTECTION

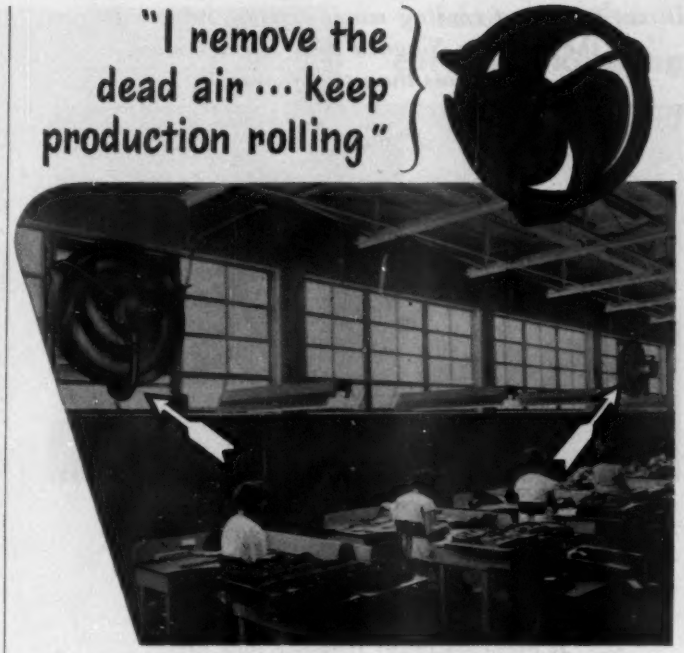
Water: Problems of water absorption that some treatments will not handle are easily solved by this material. This mastic water repellent is used effectively on all unglazed masonry surfaces including cement block, concrete block, brick, stucco, cast stone, stone and other surfaces. Thus, spalling, cracking, crazing, and general disintegration of masonry is prevented. When combined with approved water repellent techniques, Tremco 101 Mastic not only protects the masonry but adds considerably to its appearance without changing the original texture of the building materially.

Colors: Available in attractive colors such as natural cement, off-white, light yellow, terra cotta, slate, and dark red.

Repainting: If, after many years of exposure, it becomes necessary to paint the mastic coating to improve its appearance, it can be done with any good oil paint.

Temperature Changes: Tremco 101 Mastic has the ability to expand and

"I remove the dead air ... keep production rolling"



• Best insurance you can buy to keep employee morale up, minimize scrap, speed production, and decrease costs is an efficient ILG rapid air change system. Thousands of plant managers have found these *extra*-powerful, *extra*-quiet, ILG Self-Cooled Motor Propeller Fans the answer to quick exhaust of excessive heat fumes, odors and stale air. Let us help you plan your fresh air system in your present or new buildings—phone nearby Branch Office (consult classified directory) or send coupon today!

ILG

REG. U. S. PAT. OFF.

FREE! Helpful 32-Page Guide

"HOW TO PLAN YOUR VENTILATING SYSTEM"

☐ Please send me a copy of your FREE BOOKLET "How to Plan Your Ventilating System"

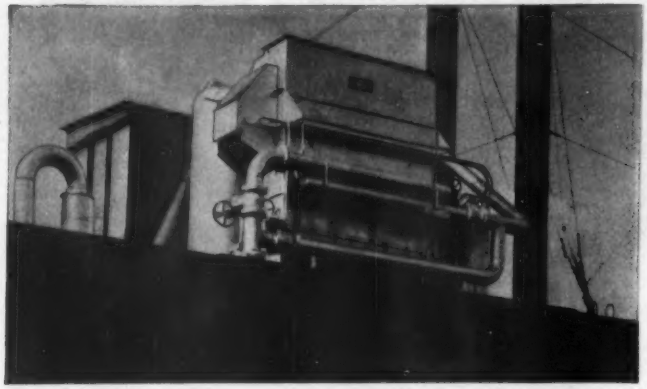
Name_____

Address_____ Zone_____

City_____ State_____

Free! New Bulletin with diagrams, data and complete information. Send coupon now.

Direct saving of cooling water expense returns to you the cost of a Niagara Aero After Cooler in less than two years.



How to Get Drier Compressed Air:

It prevents many troubles and saves much expense

● NIAGARA AERO AFTER COOLER cools compressed air or gas below the temperature of the surrounding atmosphere. Therefore you get no further condensation in your lines. You save much in repairs to pneumatic tools and equipment; you save much interruption to production; you save water damage in paint spraying, in air cleaning, in any process where compressed air comes in contact with your materials or parts in manufacturing (sand blasting, for example).

Niagara Aero After Cooler uses evaporative cooling, saving 95% of your cooling water consumption. This saving quickly returns the cost of the equipment to the owner or makes extra cooling water available for other processes.

The Niagara Aero After Cooler produces compressed air with 30% to 50% less moisture than by ordinary cooling methods. Other Niagara equipment provides bone-dry air for processes requiring it.

If you have an air problem or a cooling problem, a Niagara engineer probably has an answer that will improve your process or save you operating or maintenance expense.

Write for Bulletin 98

NIAGARA BLOWER COMPANY

Over 35 Years Service in Industrial Air Engineering

Dept. PE, 405 Lexington Ave. New York 17, N. Y.

Experienced District Engineers in all Principal Cities

contract with temperature changes thus providing a positive type of protection and decreasing the possibility of cracking under the stress and strain of such movements.

Manufacturer: The Tremco Manufacturing Co., 8701 Kinsman Rd., Cleveland, Ohio.

PE's Own DO

(Continued from page 72)

quota. He is then allowed one-half of this amount as his quota for the remainder of this quarter. He does not have to charge his MRO expenditures so far this year against this quota.

Q. What if this quota for the remainder of the first quarter of 1951 is too small to permit a firm to obtain the MRO supplies it needs to fill DO-rated orders already on hand?

A. In that case the firm may file with the NPA an application for an increased quota, and it may consider this increased quota approved unless it is advised to the contrary by the NPA. One-half of this increased quota may be used prior to April 1.

Q. Is any provision made for quota adjustments in later quarters?

A. Yes. Any person may at any time file with NPA a request for adjustment on the ground that his MRO quota is not sufficient for his requirements, or that it works an undue or exceptional hardship on him not suffered generally by others in the same trade or industry, or that its enforcement against him would not be in the interest of national defense or the public interest.

Q. Suppose a firm has been granted an increased quota for MRO. Must it make a new application for each succeeding quarter?

A. No. Once an increased quota is established, this becomes the firm's standard quota, unless the increase was granted on a temporary or seasonal basis, or is otherwise restricted by NPA.

Q. Many firms have already placed non-rated orders for MRO supplies. May these firms now apply DO-97 ratings to them?

A. Yes, and the ratings will take effect as of March 15 if the firm applies the DO-97 to these outstanding orders before that date. All MRO orders carrying a DO-97 rating applied prior to March 15 shall take effect as of March 15, while all ratings applied on or after March 15 shall take effect as of the dates when applied.

Q. What if a machine repair shop is hired by the proprietor of a shoe shop to repair a machine. To whose quota are the repair parts used on this job charged?

A. The machine repair shop may use a DO-97 rating to the same extent that the shoe shop proprietor would be permitted to use it if he himself were repairing his own machine. The cost of the materials is charged to the MRO quota of the person for whom the work is done—in this case the shoe shop proprietor.

Q. Suppose a home owner needs to obtain repair parts for some equipment in his home. May he also make use of the DO-97 rating?

A. No. The rating may not be used to obtain materials for personal or household use.

WHAT TOOL
spreads man-hours farther?

...The right brush! To cover more ground with existing maintenance man-hours, be sure your painters are equipped with the correct painting tools from Osborn's complete line of fast-working, top-quality paint and varnish brushes.

Built for industry by the company that knows industry's problems, each type of brush in Osborn's line is designed for efficient use on a specific class of work . . . to last longer, hold more paint, cover areas more uniformly, save painters' time and effort, thereby cutting maintenance costs.

To simplify your buying, specify Osborn on all brush requirements and order from your Industrial Distributor along with other mill supplies. *The Osborn Manufacturing Co., Dept. 438, 5401 Hamilton Ave., Cleveland 1, Ohio.*

OSBORN

LOOK FOR THE NAME OSBORN . . . RECOGNIZED EVERYWHERE FOR QUALITY WORKMANSHIP AND MATERIALS

Ideas on the care and keeping of brushes

GOVERNMENT restrictions now limit the percentage of pure bristle that can be used in the manufacture of paint brushes. In spite of these limitations, however, your new Osborn brushes will provide you satisfactory performance when given proper care and attention. The following guide shows what basic steps can be followed in maintaining the efficiency of your brushes.

1. *Before using* soak a new brush in raw linseed oil at least twenty-four hours.

2. After removing excess oil, dip the brush into the paint, allowing the paint to penetrate to *half* the length of the bristle.

3. Remove excess paint by drawing the *flat* side of the brush over a wire fastened across the top of the paint can.

4. Brush the bristle ten or twelve times across a rough surface to remove any loose hairs.

5. For best coverage when painting, hold the brush at a 45° angle to the surface, using the flat side of the brush from the tip to half the length of the bristle.

Clean the brush thoroughly, immediately after using

6. Use turpentine, benzine or gasoline to remove paint or varnish; alcohol to remove shellac; water to remove water paints; lacquer thinner to remove lacquer.

Wrap brush in a heavy kraft paper and suspend in linseed oil. *Do not stand brush on bristle end.*

Drying Vinyl for Safety Glass

(Continued from page 75)

from sticking, bicarbonate of soda in powdered form is placed on it. The vinyl sheets are 0.015 in. thick and vary in width from 12 in. to 42 in.

After the vinyl sheeting is received by the safety glass manufacturer, he must wash off the bicarbonate of soda by passing it through a water rinse. Following this is a squeeze roll, which is used to remove as much of the water as possible. It has been estimated that approximately 2 to 3 per cent of the weight of the material would be left on the surface following the squeeze roll. This is in addition to the moisture contained within the vinyl sheet.

In order to completely dry the vinyl sheet, it is passed under six 230 volt, 2275-watt radiant heaters with an over-all length of 61½ in. and a heated length of 48 in. The conveyor has a width of 48 in. and a speed of 22 fpm. This gives a total radiation exposure time of 15 sec.

The radiant heaters are placed on 10 in. centers and mounted 6 in. above the vinyl sheeting. In the event of stoppage of product flow, the heaters are turned away from the web by means of a mechanical lever operating through a connecting linkage. Counter-balances to facilitate rotating are mounted on each heater. At present, a solenoid-controlled air-pressure piston is being installed so as to turn the heaters from the web automatically.

For the drying operation, the web continues, carried horizontally into a cooling room, maintained at 68 F and a 20 per cent relative humidity. The web is automatically carried on to a swinging type drying rack. This is for the purpose of cooling, which requires 5 min., as the temperature of the web has been raised to 150 F in the drying operation. After leaving the rack, the sheeting is rerolled in the cooling room and is then shipped to the department where the safety glass is actually fabricated. At this point, the total moisture content of the vinyl sheeting has been reduced to approximately 0.5 per cent.

Small Plant Operation Superior to Large Ones

SMALL PLANTS and businesses have multiple advantages over large companies from the standpoint of labor and community relations. A fine future for small business in this country is predicted; furthermore, Government has a policy of encouraging small concerns.

These remarks were based largely on the operation of the Sylvania Corporation which was described as a "large, small company operating under a policy of decentralization of manufacturing wherein the line authority is out in the field and the functional authority stays at headquarters."

While this particular company's business is fairly large — $150 millions of sales — the plants for the most part are small. With the exception of one small test equipment plant, the smallest plant has 230 employees and the largest has 2,900 employees.

Breaking up the manufacturing operations into these small plants was deliberate on the part of Sylvania. Benefits to be derived from small plant management was experienced during the war. The most important part of small plant operation is the all-round experience and actions necessary on the part of management personnel. The small plant can not afford a small army of specialists. *By Don G. Mitchell, Sylvania Electric Products, Inc., New York City, at the ASME annual meeting in New York.*

Solve toughest large scale ventilating problems

The low-contour Airmover gives you high-capacity air movement

You can have all the ventilation you want—at economical cost. Airmover exhausts large quantities of heat, smoke or fumes rapidly through its short-air-travel, low-air-friction construction. It's only 32 inches high, built in rectangular units that can be placed on any type roof.

Install any number of units in continuous runs. You literally can "open your roof to the sky", yet have full weather protection. Single units or shorter runs prove effective over specific "hot spots". The low contour and unusual flexibility have made Airmover the popular industrial ventilator. Write for Folder 326D.

The Swartwout Line includes a variety of gravity and powered ventilators.

The Swartwout Co.

18511 Euclid Avenue • Cleveland 12, Ohio

Industrial Ventilation Specialists Since 1904

Free your hands with a ZIP!

HANDLE IT "THRU-THE-AIR"—FASTER—FOR LESS

Skilled hands shouldn't be load-lifters. There's more important work for them to do — more profitably!

Take the hands out of handling — make your man-hours more productive by using Zip-Lifts wherever loads must be handled frequently — along assembly lines, beside machine tools, etc. Make it a push button job.

There's nothing like the Zip-Lift for all-round service and quality — America's favorite wire rope electric hoist.

You pay so little more for ADDED VALUES like these—

SAFER — Full magnetic control with current reduced to 110 volts at push button. Plugging crane type limit switch. Large double brakes. P&H has never stretched a motor rating. That's *your* protection.

LIFETIME CONSTRUCTION — Precision built — shaved gears run in oil — grease-sealed bearings — fully enclosed.

SEE YOUR ZIP-LIFT DEALER, or write us for Bulletin H-20 — it's filled with time-saving ideas for you.

P&H ELECTRIC HOISTS
4682 W. National Avenue
Milwaukee 14, Wisconsin

HARNISCHFEGER CORPORATION

EXCAVATORS • OVERHEAD CRANES • HOISTS • ARC WELDERS & ELECTRODES • SOIL STABILIZERS • CRAWLER & TRUCK CRANES • DIESEL ENGINES • CANE LOADERS • PRE-ASSEMBLED HOMES

New Products and Methods

ASPHALT FLOOR PATCH

Is easily applied, fast setting; factory mixed and ready to use

Just three steps are necessary in applying Ready Patch—1) prime the repair spot, 2) fill with Ready Patch, 3) tamp it into place. It's ready for traffic then, company says; there's no waiting or "setting" time.

Among advantages claimed for Ready Patch are durability, permanent bond and economy. It's said to provide a resilient tough surface that lasts for years and is stable under heavy traffic. It bonds to concrete or wood floors, doesn't curl under heavy loads, and feathers to a thin edge. Its economy, company points out, lies in the saving of excessive labor costs necessary when chipping, undercutting and removal of entire concrete blocks must be undertaken. Ready Patch is ready for use just as it comes from the container. A tamper is included free with an initial 55 gal drum order. Bitucote Products Div., Bridges Paving Co., St. Louis 10, Mo.

MAGNETIC ELEMENT

For conveyors handling skelp, plate, sheet, rod, bar, pipe

This permanent Alnico magnetic element for conveyor installations is designed to offer many advantages. Because a standard iron pipe length or other standard section can be used as the revolving induced magnetic unit, these conveyor elements are simple to repair, resurface or replace. A maximum amount of conveyed magnetic material is subjected to direct action of the magnetic field, since this is at right angles to material movement and extends the full width of the conveyor.

Magnetic force isn't limited by diameter of magnetic rotating member, manufacturer points out, because magnetic element is a separate unit and can be varied in size and strength as required. Magnetic strength can be adjusted by changing air gap between plate magnet and revolving members suspended above. The magnetic element can be swung down and away from magnetically induced members for easy cleaning, or for non-magnetic operation. Eriez Mfg. Co., Erie, Pa.

POWER SOCKETS

Magnetic type, come in ¼, ⅜ and ½ in. square drive sizes

These sockets are described as especially useful for self-tapping screws. An Alnico magnet is imbedded in each socket and holds these screws firmly, making it easy to insert and install them where needed. As standard handles and extensions can be used

with the sockets, they speed up the job of starting the screws. The sockets are equally useful for starting and removing regular bolts and nuts in restricted spots.

Seven hexagon sizes from ¼ to ½ in. come in the ¼ in. square drive; four sizes in the ⅜ in. and ½ in. drive. Sockets are for either power or hand operation, have gun-metal finish. Snap-on Tools Corp., Kenosha, Wis.

RECLOSING RELAY

For reclosing equipment with power circuit breakers

Features of the new Type ACR Relay, not available in company's previous design, are: optional automatic reset at a definite time after any successful reclosure attempt; a self-contained means for permitting instantaneous initial and time-delay subsequent breaker tripping, and faster immediate reclosure. Completely automatic reclosing equipments protect feeders against unnecessary outages due to temporary faults, by automatically restoring service.

The ACR may be adjusted for one, two, or three delayed reclosures in addition to immediate reclosure. Delayed reclosures occur at 15 sec minimum intervals. By adjustment of cams, longer intervals can be obtained; or definite-

(Continued on page 110)

You can add years of life to your equipment with PITT CHEM Protective Coatings

In these busy days . . . when new equipment is hard to get . . . you'll want to make your *present* equipment *last* as long as possible—*produce* as much as possible. That's where Pitt Chem Protective Coatings fit into your picture. They guard equipment with a tough, impervious film that protects surfaces against practically all types of industrial corrosion and contamination.

Laboratory-controlled from raw materials to finished product, Pitt Chem Protective Coatings are completely uniform and dependable. • For more information, write today for new booklet, "Control Corrosion Through Pitt Chem Protective Coatings."

See Your Nearest Pitt Chem Man

PITT CHEM
Industry's Most Comprehensive Family of Protective Coatings

- ★ Hot Applied Tar Base Coatings
- ★ Cold Applied Tar Base Coatings
- ★ Alkyd Base Coatings
- ★ Chlorinated Rubber Base Coatings
- ★ Vinyl Base Coatings
- ★ Phenolic Base Coatings

WAD 3947 **PROTECTIVE COATINGS DIVISION**

PITTSBURGH COKE & CHEMICAL CO.
GRANT BUILDING • PITTSBURGH 19, PA.

OFFICES: New York • Chicago • St. Louis • Tulsa • Houston • Los Angeles • San Francisco

ERIEZ MAGNETIC ATTRACTIONS

ERIEZ MANUFACTURING CO., ERIE, PA., U.S.A. • PRODUCERS OF MAGNETIC SEPARATORS AND SELLERS OF (RCA) ELECTRONIC METAL DETECTORS

IT'S A FACT... 734,254 BEEF LIVERS AND 5956 CARCASSES WERE CONDEMNED IN A YEAR BECAUSE OF ABSCESS AND PERICARDITIS CAUSED BY *TRAMP IRON* IN CATTLE FEED LOSS...OVER 3 MILLION DOLLARS! *ERIEZ* ATOMAGNETS FIGHT THIS BECAUSE THEY WON'T LET TRAMP IRON PASS.

TO KEEP THE WALLS UP THEY USED *ERIEZ* PERMANENT PLATE MAGNETS IN GRAVITY FLOW CHUTES AT AN OHIO CHEMICAL PLANT. WITHOUT THIS PROTECTION FROM TRAMP IRON SPARKING, EXPLOSIONS WERE SO FREQUENT... 9 A DAY AVERAGE.... THAT THE WALLS WERE MADE TO FALL OUTWARD AT THE SLIGHTEST BLAST TO AVOID MAJOR DAMAGE!

..... SINCE INSTALLATION ..... **NO EXPLOSIONS!**

YOU DON'T HAVE TO BEAT THIS DRUM ...FOR RESULTS. THE *ERIEZ* MAGNETIC *DRUM* AUTOMATICALLY REMOVES STRAY IRON.... SOME DANGEROUS TO MACHINERY.... SOME THAT CAN BE SOLD. *USED IN EVERY INDUSTRY!*

FIVE DOLLARS SAVED A YEAR FOR EACH DOLLAR INVESTED... THE RESULT OF *ERIEZ* MAGNETIC HUMP SEPARATOR INSTALLATIONS AT A SOUTHERN TEXTILE PLANT...*WOODSIDE MILLS*. AVERAGE NUMBER OF FIRES *BEFORE ERIEZ* HUMPS WERE IN...*12* PER YEAR! *AFTER INSTALLATION*..... NO FIRES...NO PRODUCTION DELAYS!

RETURN THIS COUPON.

ERIEZ MANUFACTURING COMPANY
204 STATE STREET, ERIE, PA.

MY CONTAMINATION OR SEPARATION PROBLEM IS:

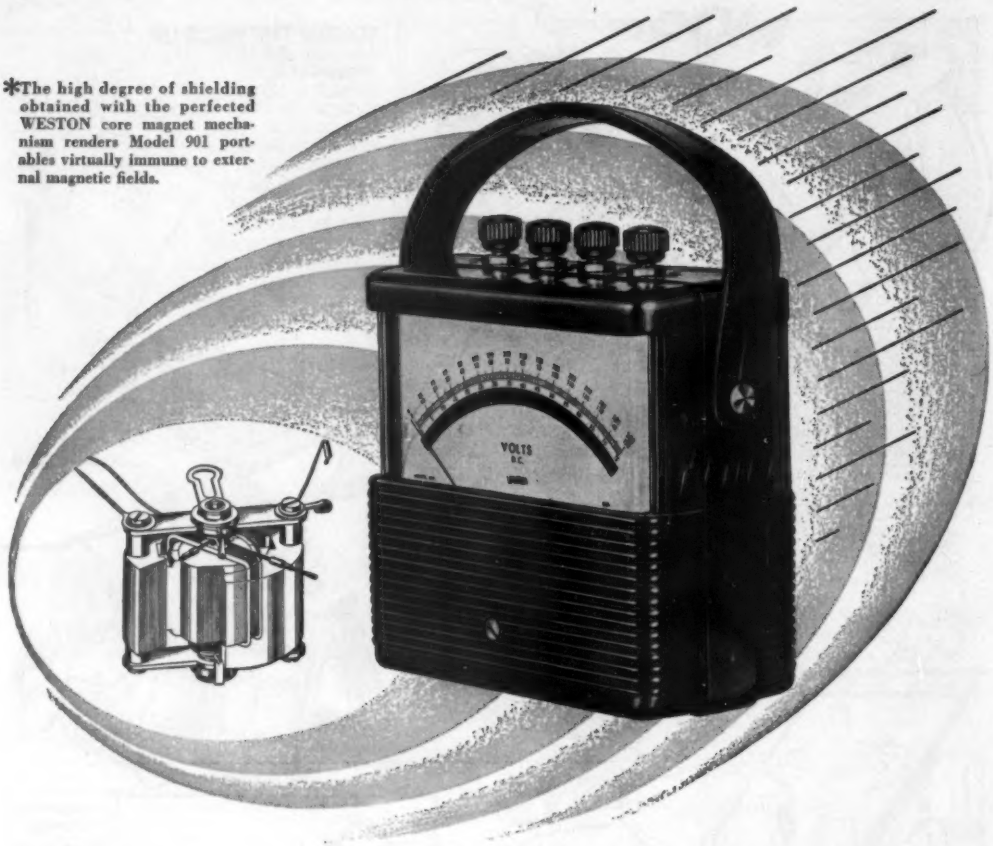
_____

_____

PLEASE SEND LITERATURE ☐
HAVE REPRESENTATIVE CALL ☐ PROMPTLY ☐ WHEN IN AREA

NAME _____
TITLE _____
COMPANY NAME _____
STREET _____
CITY _____ ZONE ___ STATE _____
BID

*Inherently SHIELDED



*The high degree of shielding obtained with the perfected WESTON core magnet mechanism renders Model 901 portables virtually immune to external magnetic fields.

For years instrument engineers have tried to build the magnet inside the moving coil for a more compact, more stable, inherently shielded d-c mechanism. In the Model 901 d-c portable instruments, Weston provides a practical and proved design of this type. The Weston core magnet construction gives uniform flux field over a wide deflection angle . . . withstands extreme mechanical abuse . . . and is exceptionally well shielded without increase in size and with a reduction in weight. Be sure to get the details of this remarkable development from your local Weston Representative, or write Weston Electrical Instrument Corporation, 624 Frelinghuysen Avenue, Newark 5, New Jersey . . . manufacturers of Weston and Tagliabue instruments.

WESTON *Instruments*

(Continued from page 30)

icing and specifications are described. Also provided are tables showing dimensions, shipping weights and materials. Golden-Anderson Valve Specialty Co.

141 Design Properties of Pipe—This new 12-pp booklet consists of tables listing pipe sizes and wall thicknesses currently established as standard, plus what is believed to be the most nearly complete tabulation ever published of the dimensional properties of commercially available sizes of steel pipe. Tube Turns, Inc.

143 Solving Steam Trap Problems—Now available is the recently revised edition of manufacturer's popular 36-pp catalog on steam traps. Contains up-to-the-minute specifications and capacities on steam traps, float traps, air release valves and pipe line strainers. Tells how to calculate condensation loads and select traps for all classes of equipment, including unit heaters, jacketed kettles, autoclaves, submerged surfaces, steam mains and header drips. Gives pointers on how to install traps with fewest number of fittings in shortest time—and how to service them quickly and efficiently. Illustrated with installation photos of traps, sketches and diagrams of typical arrangements, construction, operation. The V. D. Anderson Co.

144 Dimensional Data Card—Dimensions on welding fittings and flanges otherwise found only by searching through catalogs and tables, are condensed and reproduced on two sides of this 8½ by 11 in. card. One side of the handy chart covers company's welding fittings, showing wall thicknesses and essential dimensions for all types for pipe sizes from ⅛ through 30 in. The other side covers forged steel flanges, giving essential dimensions and bolting data for pipe sizes from ⅛ through 24 in. Taylor Forge & Pipe Works.

145 Expansion Joints—Bulletin EJ-1912 is a recently revised 12-pp edition of booklet covering both gun-packed and gland-packed expansion joints. Fully illustrated with photos and sectional drawings, cites advantages of both types, discusses construction details, servicing. Includes dimensional data, weights, list prices. Yarnall-Waring Co.

146 To Stop these Leaks—Catalog 41-0 offers 28 pp of helpful ordering and application data on pipe repair clamps and saddles, valve and bibb reseaters. Illustrates each product, tells where to use it and how to install it, giving dimensions and prices. Includes an interesting table showing estimated cost of different size leaks in air, steam, water and oil lines. M. B. Skinner Co.

147 One-Piece Fintubes—Eight-pp Bulletin 511 describes construction of integral surface fintubes; lists range of sizes and available materials. Illustrates wide variety of heating and cooling applications and gives some extremely helpful engineering data, including design curves and a tabulation of comparative outside surface areas provided by different sizes of bare pipe or tubing, and longitudinally finned pipe or tubing. The Brown Fintube Co.

VENTILATION, DUST CONTROL

148 Push Button Ventilation — Illustrated 6-pp Bulletin 680 gives sizes, dimensions and performance data on power roof ventilators for flat, curved or peak roof installations, having 18 to 60 in. fan diameters and capacities to 78,800 cfm. Gives advantages of ventilation by positive air displacement. Propellair Div., Robbins & Myers, Inc.

149 Industrial Ventilating Equipment—Catalog 2, 24 pp, covers manufacturer's Dynaflow, Ductype, and Aerostat ventilating equipment, explaining design features, giving recommended applications, and providing engineering information on all types. Special purpose equipment is also described and illustrated and there's a helpful discussion on factors to be considered in ventilation installations. Technical data includes table of friction loss in round ducts in inches of water. South Bend Air Products, Inc.

150 Dust Suppression Systems—Bulletin FT-107 describes and pictures manufacturer's Hydro-Clones for control of industrial dust by wetting, to reduce dust particles to an easily disposable sludge and clear the air of soluble gases and fumes. Features a unit for suppression of dust and sparks from cupolas. Also pictures installations of other types of Hydro-Clones. Whiting Corp.

151 The Efficiency of Decantation.—The decantation principle as applied in dust control systems, and how it separates high carbon content particles from fly ash for re-injection as fuel, is discussed in illustrated Catalog 200D. A typical installation is diagrammed and efficiency curves included. Long run economy and other advantages listed. The Thermix Corp., Pratt-Daniel Corp.

WATER TREATING

152 Silica Removal—"Zero Hardness by Amberlite Deionization" is a 4-pp folder designed to help plant engineers evaluate usefulness, applications and recommended layout of ion exchange systems to provide water free from hardness, carbon dioxide and silica. Text explains results to be expected from both single-bed and multiple-bed systems. Case histories, illustrated by block diagrams, are presented. Resinous Products Div., Rohm & Haas Co.

153 Slurry Type Softener—Six-pp Bulletin W-212-B1 describes a slurry type precipitating softener and conditioner in which energy for floc preparation is mechanical, explaining and illustrating flow circuit. An excellent question-and-answer appraisal of system is included, and equipment is pictured. Worthington Pump and Machinery Corp.

154 Treating Sulfide Contaminated Water—A practical and low-cost method of removing malodorous sulfides from water supplies by means of company's Amberlite IRA-410 which, when operated in the chloride cycle, will effectively remove and replace sulfides with chloride ions. Discusses operating procedure, properties of this amine-type anion-exchanger, regeneration, simultaneous softening and sulfide removal. Includes graphs showing effect of influent composition on sulfide capacity and sulfide capacities at pH 7.0. Resinous Products Div., Rohm & Haas Co.

MECHANICAL POWER TRANSMISSION

155 Manual on V-Belt Drives—Catalog 280 is pocket-sized, but contains 384 pp of illustrations, tables and other technical information to make it possible to select V-belts for any power transmission drive quickly and accurately. For ease of use, the various sections are printed on different colored paper. List prices, dimensions and an interchangeability list are included, also a 12 pp supplement on cog belt drives. The Dayton Rubber Co.

156 Flexible Couplings — Illustrated Folder 2363 on company's BC roller chain flexible shaft couplings gives engineering information for proper application. Includes dimensions, weights, service factors, horsepower ratings. Detailed data is given on two types of protective grease-retaining casings—a spun metal revolving type and a plastic revolving type. Link-Belt Co.

157 Chain Hand Book—An authoritative 32-pp booklet, Catalog ARC-51 is packed with suggestions on how to install, maintain and operate roller chain. Tells how to plan chain drive layouts; offers valuable hints on lubrication and roller chain selection. Also contains length conversion tables, horsepower rating charts, list prices with specifications for all types of roller chain and extended pitch conveyor chain. Atlas Chain and Mfg. Co.

158 Adjustable Speed Control—Not an ordering catalog, this well-organized 24-pp booklet, Bulletin GEA 5334, presents a summary of economical and engineering benefits from properly-applied adjustable speed drives. It provides a check list of points to be considered in selecting a drive and describes and illustrates manufacturer's packaged adjustable speed drives. Includes a comparison chart on performance features and characteristics of drives described. General Electric Co.

COOLING

159 Double Inlet Cooling Towers—Section 41 describes and illustrates manufacturer's Dry-Fan cooling towers with double-inlet squirrel cage duplex blower, and capacity range of 32 to 60 t of refrigeration. Includes specifications, selection table for air conditioning and related applications, typical temperature performance data, directions for assembling. Binks Mfg. Co.

160 Water Cooling Units—Here's a folder introducing a portable, self-contained water cooling unit for use with cooling towers, spray ponds, river, well or city water, also brine. Cooler is compact enough to clear standard doors, has refrigerating capacities from 2 to 150 t. Gives specifications, capacity data, applications. Two typical installations are explained, illustrated. Mayer Refrigerating Engineers, Inc.

161 Cooler with Fins—A new oil and water cooler and the several advantages provided by its improved design are described in 20-pp Bulletin 1020. Explains how company's LK-Fin Cooler, distinguished by use of helically-finned heat transfer elements instead of bare tubes, is a lighter, more compact and less costly unit for a given cooling service. Diagrams show comparisons of length and number of tubes and size of units for equivalent heat transfer surface. Also presented are design details which provide effective heat transfer, permit expansion of tube bundle, prevent intercleakage and leakage to outside. Includes selection data for various

---

April, 1951

Card void after 6 months.

PLANT ENGINEERING

Please have manufacturers send without obligation information or bulletins indicated by following numbers.

.....

.....

.....

.....

.....

Please Print or Typewrite

Your Name .....

Your Title .....

Your Company Name .....

Company Address .....

City ..... State .....

(If you prefer delivery at your home also fill below)

Home Address .....

City ..... State .....

.....

.....

.....

Also, use this card for more information on advertised products.

ranges of duties, dimensions, specifications. The Griscom-Russell Co.

162 How Heat Transfer Equipment Serves—"New Industrial Horizons" is a 32-pp booklet showing how refrigeration and air conditioning equipment is being used to provide control of heat, humidity, air motion and cleanliness. Describes briefly some of the many jobs where heat transfer equipment can pay rich returns, and explains basic systems—fluid to air transfer, fluid to fluid cooling, evaporative cooling, air conditioning and mechanical refrigeration. Installation photos illustrate descriptions of specific applications—from cooling of electroplating baths to plant air conditioning. General Electric Co.

163 Liquid Chillers — Illustrated Form FC-1, 2 pp, describes self-contained liquid chilling units adaptable for low cost cooling in a wide range of industrial and commercial applications. Stresses compactness, easy installation of the factory-assembled chillers. Lists some of the jobs they're built to handle. Acme Industries, Inc.

EQUIPMENT FOR HAZARDOUS LOCATIONS

164 Explosion-Proof Motor — Bulletin SL300-5 describes and illustrates a totally enclosed motor for use in refineries, chemical plants, grain elevators, etc. Explains design features which contribute to its safe operation in hazardous locations. Crocker-Wheeler Div., Elliott Co.

165 Fire-Resistant Hydraulic Fluids—This 12-pp illustrated booklet on company's hydrolubes presents their physical properties and advantages. Tells how to use these fire-resistant fluids, developed to meet the need for hydraulic oils which could be used where fire hazards exist. Their fire-resistance, high viscosity index, low leakage loss, reduced hazard to personnel described. Carbide and Carbon Chemicals Div., Union Carbide and Carbon Corp.

166 Water Cooler—This illustrated folder describes an electrically operated water cooler designed for use in hazardous locations. Safety features of the cooler are stressed. Sunroc Refrigeration Co.

ENGINES, GENERATORS

167 Re-Circulation Steam Generator—Here's a 6-pp folder introducing a controlled re-circulation steam generator, describing its development and recommended uses, such as where steam is required in remote locations, where demands are intermittent or load fluctuating. Illustrated by cutaway drawing, text explains generator's operation, principle features. Combustion Engineering-Superheater, Inc.

168 Diesel Engines—Construction and operating features of manufacturer's four-cycle, one-cylinder, and new two-cylinder vertical mechanical injection Type 4PB diesel are presented in Bulletin 123. Those described have 4½ in. bore and 5½ in. stroke, with electric or manual starting. They are offered as self-contained electric generating sets, pumping units, and bulletin shows various engine applications, gives kilowatt ratings, pumping capacities. Pictures main parts, gives specifications. Nordberg Mfg. Co.

HEATERS, HEATING

169 The Case for Space Heaters—Eight-pp Bulletin 526, describing manufacturer's Counterflo direct-fired space heaters in gas or oil fired models with outputs from 400,000 to 2,000,000 Btu per hour, features a comparison chart showing that the steel requirements for installation of these heaters are substantially less than those of many other systems. Thirty reasons for their growing industrial acceptance are listed. Heating Dept., Dravo Corp.

170 Why Open-Coil Heaters—The direct economies of heating boiler feedwater and the advantages of open-coil construction in company's feedwater heaters and purifiers are discussed in detail in illustrated Bulletin 117, 16 pp. Covers deaerating and non-deaerating type heaters. Stickle Steam Specialties Co.

OTHER EQUIPMENT

171 Tramp Iron Removal—Bulletin 702, on company's Magnetic Hump, shows how this non-electric permanently magnetized unit is designed to remove tramp iron from materials conveyed in pneumatic, gravity flow or liquid lines to prevent damage to machinery as well as risk of fires and contamination of product. Includes construction and application data, information on selection of proper magnetic separator and engineering diagrams. Eriez Mfg. Co.

172 Inventory Control Guide—Quick answers to production and inventory control questions are provided in this 40-pp book. Specifically, it offers remedies for bottlenecks in production before they become acute. Good record-keeping management for continuous, uninterrupted production flow is highlighted. Punched card methods are shown for each phase of production control including engineering records and procedures, production and forecasting, materials controls scheduling and progress reports. Major flow functions are explained. The "how" of scheduling defense orders for regular as well as new productions, processing orders according to schedule, accurate delivery dates are subjects covered. Remington Rand, Inc.

173 Aluminum Casting Alloys—This informative, 40-pp technical book on aluminum alloys covers their metallurgy, corrosion resistance, specifications and foundry practices. Illustrated throughout, book also explains company's system of aluminum alloy nomenclature. The section on metallurgy discusses effect of copper, silicon, magnesium, manganese, iron, zinc, nickel and titanium on aluminum. Specification tables cover sand casting, permanent mold casting, and die casting alloys. Federated Metals Div., American Smelting and Refining Co.

174 Steam Condensers—Bulletin 103, 24 pp, is a comprehensive presentation of manufacturer's steam condensers and includes photos of six typical installations as well as a section of engineering data, a discussion of air removal equipment, and a chapter on condenser maintenance. Such special equipment as company's Wizard injector to seal small leaks while condenser is in operation, air erosion eliminators, divers lights and port gages, plugs, shock testing apparatus are also described and illustrated. Condenser Service & Engineering Co., Inc.

175 Gas and Oil Burners—This is a series of bulletins covering gas and combination gas-and-oil burners for natural, refinery and by-products for natural or forced draft, high or low pressure and for boilers of all sizes. Gives excellent application information on the various models. John Zink Co.

176 Gear Hardening Machine—Detailed operational information about company's new radio-frequency gear-hardening machine, the Inductal, is presented in Bulletin B-5259. The machine's adaptability in handling spindle gears, spur gears, cluster gears and shafts for either through or contour hardening is explained with the help of diagrams and photos. Explains how versatility of operation is achieved by a single-spindle type of feed. Illustrates simple mechanical drive system, and diagrams power, water requirements for an installation. Westinghouse Electric Corp.

177 Filter for Dirty Liquids—A new hydraulic filter for use wherever dirty liquids are collected and re-circulated, and recommended for use on many hydraulically operated machines, is presented in Bulletin HF-3. Specifications are given. Cutaway drawing shows how filter is designed to provide maximum filtering area in minimum space. Dollinger Corp.

178 Fluid Pressure Boosters—Practical advantages and applications for company's "dual" pressure" boosters manufactured from standard air and hydraulic cylinder components are highlighted in this illustrated 4-pp article. Savings in air consumed, savings on circuit valves, holding of pressures (to 10,000 psi) indefinitely, and convenient adaptability in circuits of small to medium volume requirements are stressed. Circuit drawing, and description of typical applications are presented. Single pressure boosters for small volume requirements and high speeds are discussed. Methods of returning booster driven hydralic cylinder, simplicity of maintenance are also covered. Miller Motor Co.

179 Colloidal Graphite as Parting Compound—Bulletin 427, 4 pp. tells how colloidal graphite dispersions are used profitably in the metal-working, glass, rubber, and corrugated boxboard industries. Gives details of many specific applications, such as parting of sintered metal clutch plates from each other, separation of ingots from molds, and removal of glass forms from milling machines. Acheson Colloids Corp.

180 Custom Steel Parts—This 16-pp booklet explains what company's custom-made flat steel parts are, how they are made and how to use and order them. Outlines the products manufactured—circular and rectangular work, odd shapes, intricate designs—and describes in detail some unusual problems soved through a combination of engineering know-how and craftsmanship. Henry Disston & Sons, Inc.

181 Catalog Preview for Process Industries—This is a 36-pp guide for recipients of Sweet's File for the Process Industries, illustrating and describing every catalog in the file. Manufacturer's index and the classification system used in the bound collection. Sweet's Catalog Service.

FIRST CLASS
PERMIT No. 353
Sec. 34.9 P. L. & R.
CHICAGO, ILL.

BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed In the United States

POSTAGE WILL BE PAID BY—

PLANT ENGINEERING
110 South Dearborn
CHICAGO 3, ILLINOIS

DOUBLE HEATING DUTY

from TRANE unit heaters

Brand new idea in heat *diffusers*

Block drafts from a window and send heat down a production line — with *one* unit . . . Wrap a doorway in comfort and heat a row of work benches — with *one* unit . . . Warm a chilly wall and send comfort into a tool room — with *one* unit . . .

A Trane Unit Heater with finger-tip adjustable Louver Cone or Louver Fin Diffuser aims heat more accurately, diffuses it more evenly, throws it farther, or sends it in several directions at once if you like.

The completely adjustable diffuser blades split, diffuse and control the air flow, making Trane Unit Heaters more efficient, more versatile than ever before.

And the diffusers do even more than shape the heat pattern to fit your job: The Louver Cone Diffuser is designed to straighten out the natural corkscrew motion of the air flowing from the vertical-discharge unit, sending heat as much as 60% farther. Thus, you can mount Trane Projection Unit Heaters higher — easily clearing craneways and other obstacles.

With blades shut, the Louver Cone diffuses air gently, evenly in all directions, so even with low mountings, workers close to the heat source won't feel a concentrated blast.

Attached to the horizontal-discharge Model H Unit Heater, the Louver Fin Diffuser works the same heat-handling miracles.

And when heating targets change, you don't have to move the unit, add more piping, or more units — you don't even need tools. Just a fingerflip of diffuser blades moves the heat right where you want it.

For full information on Trane Unit Heaters and Diffusers, see your local Trane representative or write The Trane Company, La Crosse, Wisconsin.

A flip of Louver Cone Diffuser blades shifts Projection Unit's heat patterns.

Projection Heaters sending comfort, efficiency down from the ceiling.

Louver Fin Diffuser delivers Model H Unit's heat where you need it.

(Left) Louver Cone straightens air flow, throws heat farther, gets it to floor. (Center) One unit and diffuser does two jobs, sending heat straight down, diffusing it outward. (Right) Louver Fin sends heat right and left; perfect diffusion, perfect comfort even for workers close to unit.

TRANE

The Trane Company, La Crosse, Wisconsin • Eastern Mfg. Division, Scranton, Pa. • Trane Company of Canada, Ltd., Toronto . . . Unit Heaters, Convectors, Heating and Cooling Coils, Fans, Compressors, Air Conditioners, Unit Ventilators, Special Heat Exchange Equipment, Steam and Hot Water Specialties.

MANUFACTURING ENGINEERS OF HEATING AND AIR CONDITIONING EQUIPMENT • OFFICES IN 80 CITIES

(Continued from page 104)
time reset after immediate reclosure attempts omitted. Connections can be changed to omit immediate initial reclosure. Switchgear Divs., General Electric Co., Schenectady 5, N. Y.

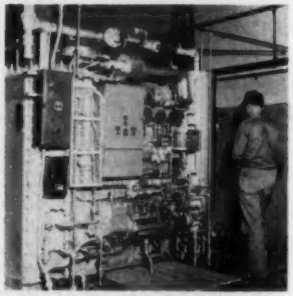
STEAM GENERATOR

A compact, complete plant; burns light or heavy oil, natural gas

Actually a complete steam plant, the C-E Re-circulation Steam Generator includes feedwater pump and control, fuel equipment and control, combustion control and safety devices, forced-draft fan, safety valves, circulating pump, all other auxiliaries. It is available in sizes for steam capacities from 2800 to 6000 lb per hr and operating pressures to 300 psig.

Its most noticeable feature is compactness; but it is distinguished from other small generators by its use of the controlled re-circulation principle. The high rate of heat transfer thus effected is said to permit maximum steam production per unit of heating surface—maximum steam output per unit of space and weight. Controlled re-circulation also assures circulation throughout heating surfaces, company explains, greatly reduces scale formation and permits higher operating efficiency.

This generator is described as particularly applicable where high pressure steam is required in relatively small quantities; where steam is required in remote locations; where demands are intermittent; where occasional emergency loads may exceed capacity of existing boilers; where load is highly



fluctuating; where fully automatic operation is desirable, and where space is a problem. Combustion Engineering-Superheater, Inc., 200 Madison Ave., New York 16, N.Y.

GLASS BLOCK

Features improvements to reduce installation time and costs

First of the new improvements incorporated in this light-directing glass block is a new finish applied to exposed faces of the block during manufacture. Being water-repellent it prevents adhesion of mortar to the faces during the laying operation and means easier and faster cleaning of panels of blocks, company explains; it eliminates need for strong acids commonly used for cleaning masonry work.

The other improvement is an electronically-applied gold stripe on the top mortar-bearing edge of each block. The stripe makes it easy to lay block in the correct position. In order to function properly, lift-directing glass block must be laid with a certain side out and a certain edge up. If all blocks in one course are installed properly, the gold line will be unbroken. Insulux Div., American Structural Products Co., Toledo, O.

ELECTRIC CHAIN HOIST

In ¼, ½ and 1 t capacities, is economical unit for fast lifting

The Type JC Hoist is intended to save time and effort on many lifting tasks. Equipped with simple rope controls, and designed for hook suspension, the hoist is adaptable for trolley mounting. It's built of high strength cast aluminum alloy with heat-treated gearing and high carbon or alloy steel ground shafts and precision ball bearings. The entire gear train is enclosed and operates in an oil bath. Relatively light in weight, the unit can be transported to areas of greatest activity. A link type steel chain, single on the smaller capacity models and double on the 1 t size, affords dependable hoisting. Hoist and Crane Div., Robbins & Myers, 1934 Clark Blvd., Springfield, O.

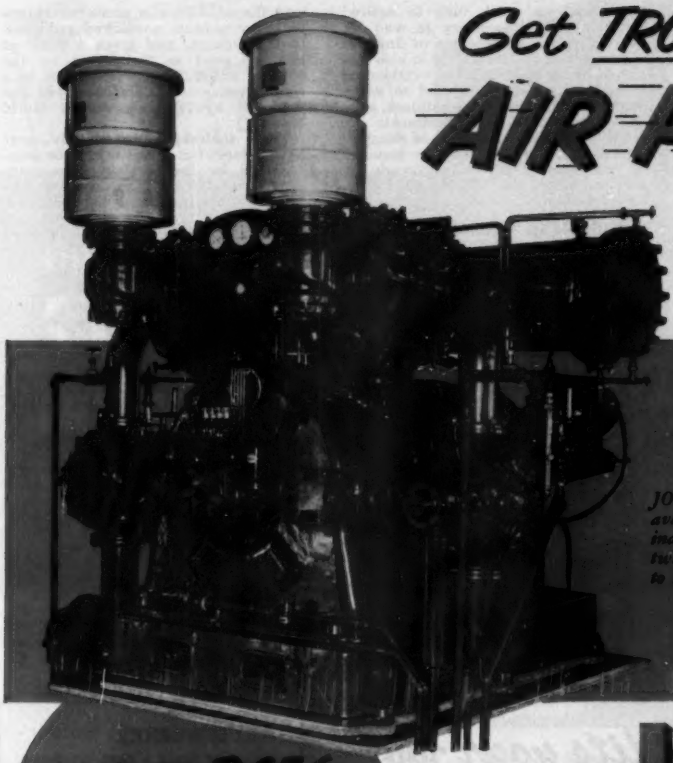
LIGHTWEIGHT TROLLEYS

Are low cost units in ½ to 3 t capacities, for lighter duty jobs

The compact Wright-Way Trolleys are made for use in industrial applications not requiring high efficiency or high

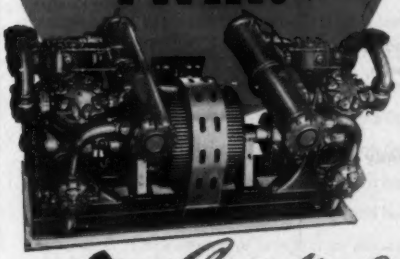
CAUTION
FOR SAFETY'S SAKE
GIVE YOUR PLANT AN INDEPENDENT WATER SUPPLY
If a fire should break out in your plant, will your fire protection system put it out before the flames get out of hand? It will if you have a Horton elevated water tank and an automatic sprinkler system. This proven combination gives 24 hour service—7 days a week.
A private water supply is best because the water in a Horton elevated tank serves your plant alone.
Furthermore, a gravity supply of water is always ready to flow the instant a fire starts.
Horton ellipsoidal-bottom tanks are built in standard capacities from 15,000 to 500,000 gals.
Write today for complete information and prices.
Right: A 150,000-gal. Horton tank at the Gerrish Milliken Mill, Pendleton, South Carolina.
CHICAGO BRIDGE & IRON COMPANY
Atlanta 3 2148 Healy Building
Birmingham 1 1552 North Fiftieth Street
Boston 10 1067—201 Devonshire Street
Chicago 4 2134 McCormick Building
Cleveland 15 2258 Guildhall Building
Detroit 26 1569 Lafayette Building
Houston 2 2166 National Standard Building
Havana 402 Abreu Building
Los Angeles 17 1574 General Petroleum Building
New York 6 3317—165 Broadway Building
Philadelphia 3 1649—1700 Walnut Street Building
Salt Lake City 4 570 West 17th South Street
San Francisco 4 1582—200 Bush Street
Seattle 1 1370 Henry Building
Tulsa 3 1669 Hunt Building
Washington 6, D. C. 1130 Cafritz Building
Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PA.

Get TROUBLE-FREE AIR POWER at ROCK-BOTTOM COST!



JOY Series 100 compressors are available in two and four cylinder models and in single and twin units. Capacities from 378 to 3656 c.f.m.

UP TO 3656 C. F. M. in a TWIN!



with a JOY PACKAGE TYPE

HEAVY DUTY WN-114 COMPRESSOR

Install it, start it,—then forget it! That's what you can do with a JOY compressed-air power unit, because it's built to give constant, dependable service 24 hours a day, year in and year out. JOY Series 100 Air Compressors are two-stage, double-acting, heavy duty, continuous service compressors—much smaller than old style compressors of the same capacity, yet with operating economies exceeding those of the older, bulkier units. JOY *pioneered* the compact, modern, "package-type" compressor.

All wearing parts are replaceable on the Series 100—the finest air compressors you can put on the job. ● *Let us give you full details on the size that fits your air-power requirements.*

Consult a Joy Engineer

100 Years of Engineering Leadership

WAD 1 3513

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

factor of safety of company's heavy-duty trolleys. They are described as reasonably efficient, easy-rolling units that are safe and durable.

They feature chilled tread wheels, husky roller bearings, heavy steel axles, equalizing pin and becket strap, heavy fabricated steel side plates. They have a factor of safety of three to one minimum on all sizes, company states, and are plain trolleys built only for standard I-beam sizes. Wright Hoist Div., American Chain & Cable Co., Inc., York, Pa.

CALIBRATED DIAL

For use with temperature regulators; for quick settings

Designed for use with company's Class T and M Temperature Regulators, requires only a quick turn to desired setting. It isn't necessary to wait for the equipment to heat up to find out if the setting is correct. It is also designed to protect against overheating caused by guess setting and to withstand rugged operating conditions, such as where frequent readjustments are necessary. Dial fits in place of standard adjusting sleeve, and can be installed on company's regulators already in service. Leslie Co., 328 Delafield Ave., Lyndhurst, N. J.

TIN-SAVING SOLDERS

Utilize silver as substitute for part of the tin

The new ST solders are basically silver-tin-lead alloys as compared with the usual tin-lead variety. Manufacturer says the addition of a small percentage of silver permits a marked reduction in tin content, and gives a joint at least as good as that given by the original alloy. It's an outgrowth of a similar series of solders developed and produced by company during World War II.

These solders require slightly more heat to melt, but this is said to be compensated by the fact that too much heat is not as harmful to them as it is to many tin-lead solders. Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

D-C POWER SUPPLIES

Are metal enclosed units, utilizing selenium rectifier stacks

Applicable where d-c power is required, this new conversion equipment may be used for exitation of synchronous motors, operation of d-c elevators, cranes and machine tools, and for conversion of a-c feeders to d-c.

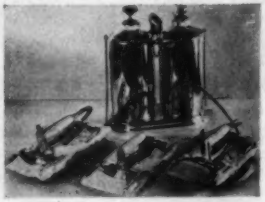
Designed for indoor installation, the rectifier units are mounted in a metal casing consisting of four separate sections, mounted one on top of the other, and bolted together. A removable front wire mesh panel permits easy access.

Units can be furnished to supply 125 or 250 v d-c from a 208-, 230- or 460-v, three-phase, 60-cycle a-c supply. Convection cooled equipments come in ratings of 0.75, 1.5, 3 and 5 kw. Fan cooled units are rated at 7.5, 10, 12.5, 15, 18.5, 20 and 25 kw. Lighting and Rectifier Divs., General Electric Co., Schenectady 5, N. Y.

WALL WASHER

For doing a neat, clean job of wall washing in less time

The Wallmaster is designed to wash, rinse and dry all types of interior wall surfaces without streaking and dripping. Special cleaner and rinse water are applied to wall surfaces with large, lightweight trowels covered with heavyweight terry cloth pads. The machine is entirely mechanical, cleaner and rinse are fed into trowels by finger-tip control from pressure tanks.



Company's Handeasy attachments, for cleaning rough, uneven surfaces, are interchangeable with the standard trowels by means of an adapter unit on the end of the two lengths of 16½ ft rubber tubing, through which rinse water and cleaner are fed. Quaker Maintenance Co., Inc., 124 W. 18th St., New York, N.Y.

The "MASTER" Line
OF MATERIALS HANDLING EQUIPMENT

The Most Complete Line of Materials Handling Equipment on Wheels

Buy the type of machine that fits your job.

Write TODAY for one or more of these new catalogs . . .

(24) Master JackLift Electric Trucks and JackStacker Electric Trucks.
(25) SpaceMaster Electric Fork Trucks.
(26) Master JackLift Trucks, Hydraulic and Mechanical Handlift Trucks, WeldMaster Skid Platforms.
(27) SpaceMaster Gas Fork Trucks.
(28) PowerMaster Stackers, Lifters, Handy Hoisters, Portable Cranes.
(29) FloorMaster Trucks.
(30) ToteMaster Gas Trucks.
(31) Loadmaster Racks for Pallet, Platform, Barrel, Drum, Bin, Unit Loads.

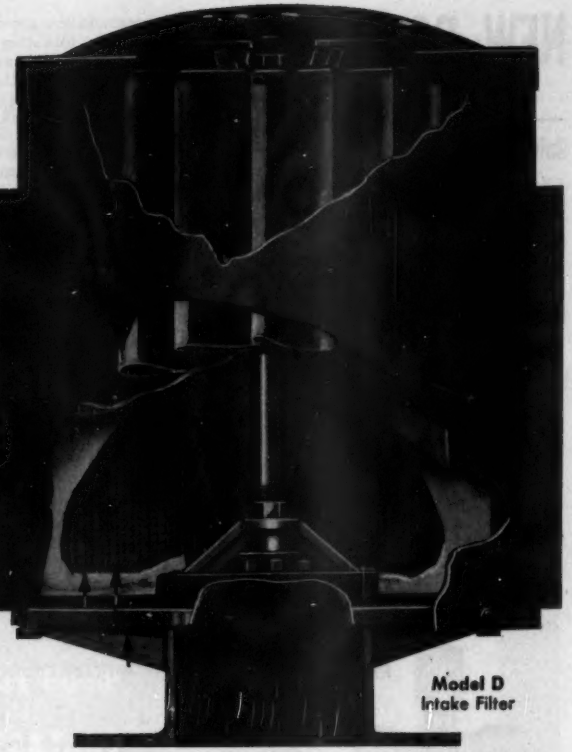
The "MASTER" Line

LEWIS-SHEPARD PRODUCTS INC.
162 Walnut Street, Watertown 72, Massachusetts
Midwest Plant: Crawfordsville, Ind.
Sales & Service in Principal Cities

NOTE:
To Men Responsible
for Engine and
Compressor Operation

THE **EFFICIENCY** OF

STAYNEW
INTAKE FILTERS
INCREASES WITH USE



Model D
Intake Filter

This fact can mean the difference between *full* and *seriously reduced* output . . . between *frequent repairs* due to intake of abrasive, clogging dust and *no repairs*.

All Staynew Intake Filters are Dry-type — no moving parts, no reservoirs, no liquids. Air velocity is not critical, temperature extremes have no effect. As dust accumulates on the medium, filtering efficiency increases — *yet tests prove that resistance may reach less than 2.75" water after thousands of hours of operation.* Radial Fin design of insert and all-wool felt medium provide unsurpassed protection . . . virtually 100%. More than 600,000 Staynew Intake Filters have been placed in service. *A fine engine or compressor deserves a fine filter.* Specify Staynews for more HP or CFM at lowest possible cost.

Model KE
Economy Filter

Model C
Small Capacity
Filter

Model DS
Silencer-Filter

A 12"x12" Staynew Radial Fin Insert Has 2059.2 Sq. In. Active Filtering Area—the same proportion as this panel bears to Insert below

This filtering area in Insert this size.....

Model IDR
Ground Level Servicing, High Level Intake Filter

Bulletin SIF On Request

DOLLINGER PROTECTOMOTOR STAYNEW FILTERS

DOLLINGER CORPORATION 55 CENTRE PK., ROCHESTER 3, N.Y.

FILTERS FOR: ENGINES • COMPRESSORS • PIPE LINES (AIR, GAS, LIQUID) • VENTILATION

NEW BOOKS

for the plant engineer

Guide for Your PM System

PREVENTIVE MAINTENANCE MANUAL. Size 4 by 7¼ in.; 30 pp; paper bound. Available from Professional Expediting Service, P. O. Box 224, West Hartford 7, Conn. Price $1.50.

THIS MANUAL should prove helpful in serving as a guide to planning your preventive maintenance program. Suggestions are given of the steps required in initiating a preventive maintenance program.

Whether outside aid should be employed or if the program should be established by plant personnel is discussed. Other items covered are fire protection, plant painting, roofs and floors, electric motors, and heating equipment.

The section on scheduling gives suggested maintenance periods for various types of equipment. The reader is cautioned, however, that the best method of scheduling will come from experience.

The back section of the manual has several helpful sample forms which could be adopted in part or whole for keeping records on a PM program. The sample forms cover Motor and Control Data; Motor Parts; Machine Identification; Servicing Record and Maintenance Cost; Maintenance Work Orders; and Hours.

NEW

Norgren

MICRO-FOG

Lubricator

Revolutionary Progress in Air Line Lubrication

This new Micro-Fog Lubricator by "The Pioneer in Oil Fog Lubrication" breaks each drop of oil down into extremely fine uniform size particles (dia. 2 microns—.00007874"—or less) that REMAIN IN SUSPENSION for an indefinite period of time.

- **Micro-Fog** travels far greater distances. Location of lubricator in relation to units served is no longer a critical factor.
- **Micro-Fog** can be uniformly distributed to several outlets—serving multiple units operating simultaneously.
- **Possibility** of flooding lines or equipment is reduced to the very minimum.
- **Air flow requirement** is greatly reduced. Constant, uniform delivery of oil fog is precision-controlled—down to as little as one drop in 20 minutes delivered into the air stream, if required.
- **Accomplishes** more thorough lubrication. Completely automatic. Fully-visible oil feed and supply.
- **Product of years** of research and development, plus over 20 years know-how in air line lubrication. Fully field-tested and approved in many industries.

See it in operation at the ALL-LUBRICATION SHOW *April 16-18 Booth 15*

25th Year of Progress

Ideal for high speed grinding spindles...small air tools...gear boxes...multiple taps & drills...air sanders...many other exacting applications.

Write for BULLETIN 425—
C. A. Norgren Co., 243 Santa Fe Drive, Denver 9, Colorado

Norgren

Lubricators, Regulators, Filters, Relief Valves, Check Valves, Air Governors, Needle Valves, Hose Assemblies and Couplings.

25 YEARS OF HELPING AIR POWER SERVE INDUSTRY BETTER

Save by Knowing How to Buy

Buyers Guide for Design of Screw Machine Products. Second edition; size 6 by 9 in.; 16 pp; illustrated; paper bound. Distributed by National Screw Machine Products Association, 13210 Shaker Square, Cleveland 20, Ohio. Price 25 cents.

HERE IS A cleverly written booklet instructing a potential buyer of the facts to consider when purchasing screw machine products.

The booklet enumerates eight reasons why costs increase, explains that design is important and discusses drawings of screw machine products. Plate and heat treating, inspection over-runs and under-runs, concentricity, finish, burring and thread sizes are other subjects covered in this booklet.

This pamphlet should prove very helpful in serving as a guide to buyers and designers of screw machine products.

For That New Look

U. S. INDUSTRIAL DESIGN 1951. Prepared by Society of Industrial Designers. Size 9 by 12 in.; 179 pp; illustrated; cloth bound. Published by Studio-Crowell, 432 Fourth Ave., New York, N. Y. Price $10.00.

THIS BOOK shows the progress made in the field of design. It covers, pictorially, such items as household equipment, equipment for personal use and recreation, commercial and professional equipment, transportation, industrial apparatus and machinery, packages and general identification programs.

Refrigerators, kitchen ranges, automobiles, kitchenware, television sets, and packages are just a few of the many items illustrated. The book should serve as a helpful styling tool to design engineers and other engineers concerned with design.

Lubrication Know-How

THE PRACTICE OF LUBRICATION by T. C. Thomsen. Fourth edition; size 6 by 9 in.; 612 pp; cloth bound. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. Price $8.00.

THIS EDITION provides a comprehensive coverage of the origin, nature, testing, selection, application and use of all types of lubricants.

It contains lubricating information relating to advances in engine and

No location problems—works underneath streets, parks, etc.

No well too deep—motor-pump unit is submerged.

Speed is not limited—motor is close coupled to pump.

Silent operation.

Crooked wells are no problem.

Saves valuable space—no surface motor or pump house.

THE BJ SUBMERSIBLE PUMP HAS IMPORTANT INSTALLATION ADVANTAGES NOT OFFERED BY ANY OTHER PUMP

Safe against vandalism.

Capacities to 20,000 gpm. Heads to 1500 ft.

No water contamination by dirt, oil, or foreign matter.

Can work beneath ice and away from atmospheric changes.

Unaffected by floods.

Get the full story on how BJ Submersibles can answer your needs . . . send the coupon now!

Byron Jackson Co.

Since 1872

P.O. Box 2017, Terminal Annex, Los Angeles 54, Calif.

Offices in Principal Cities

Precision assembled at factory—installed without adjustments.

Installation is easy.

BJ PUMP DIVISION, DEPT. 65

Please send me full information on the BJ SUBMERSIBLE.

NAME_____

CO. or DEPT._____

ADDRESS_____

CITY_____ STATE_____

K-P *Engineered*

WIRE CLOTH & WIRE SCREENS

★ SIEVING
★ SIZING
★ SEPARATING
★ CONVEYING

Korb-Pettit Wire Cloth and Wire Screens are not only first quality in material and workmanship but are engineered for the job involved. Available in High Carbon Spring Steel and Oil Tempered Spring Steel for extreme abrasion resistance. Also supplied in suitable metals and alloys for corrosive and high temperature conditions.

Wire Cloth,
Wire Screens,
Spiral Woven Wire
Conveyor Belts,
Complete Special Purpose
Conveyor Systems
designed and
manufactured,
Wire Partitions,
Machine and Window
Guards, Cages,
Enclosures, Grills, etc.

KORB-PETTIT
WIRE FABRICS AND IRON WORKS
INCORPORATED
Engineers and Manufacturers
1501 No. Mascher St.
Philadelphia 22, Pa.

Ask for HANDBOOK No. 36

machinery construction involving higher pressures and extremes of heat and cold; facts on the distillation and refining of lubricating oils; information on the manufacture of engine-oil inhibitors and a chapter on the purposes for which they are used.

Helpful lubrication information is supplied to cover steam turbines, railway rolling stock, transmission shafting, machine tools, textile machinery, steam engines, gas engines, etc.

The book also discusses a number of typical lubrication problems, analyzes them from an engineering standpoint and points out how each problem can be solved.

Can Wages be Increased?

WORKING UNDER WAGE STABILIZATION. Size 8½ by 11 in.; mimeographed 11 pp plus PSB regulations. Published by California Personnel Management Assn.; Farm Credit Building, Berkeley 4, Calif. Price $1.00.

PERTINENT current information on when wage increases can and cannot be granted without approval of the Wage Stabilization Board. Covers the text of an association paper by John R. Dille, of U. S. Dept. of Labor, plus 7 pp of questions and answers asked and answered at the meeting. Also includes copies of Regulations 1 to 5 of the WSB.

Metallurgy and Piping

METALLURGY AND PIPING 1950. Size 8¼ by 11½ in.; 42 pp; stapled. Available from Edison Electric Institute, 420 Lexington Ave., New York 17, N. Y. Price $2.25 to non-members, 90 cents to members.

THIS REPORT contains statements relating to metallurgy and piping on high temperature materials, high temperature pipe welding and fabrication specifications, graphitization and valve outages.

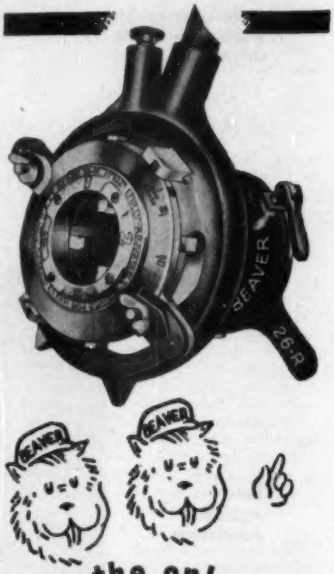
The report contains three tables on high-temperature pipe welding and fabrication specifications which are a correlation of the welding and fabricating data submitted by several boiler manufacturers and piping fabricators. The comparative tabulations presented should prove a valuable source of reference information and the compilers hope it will form a basis for further correlation and coordination.

Throw Away Crystal Ball

EFFECTIVE MANAGEMENT THROUGH PROBABILITY CONTROLS by Robert Kirk Mueller. Size 6 by 9 in.; 310 pp including index; illustrated; cloth bound. Published by Funk & Wagnalls Co., 153 E. 24th St., New York 10, N. Y. Price $5.00.

THIS BOOK is written to show management how statistics can be used to calculate managerial risks, as well

BEAVER 26-R



the *only* tool of its kind *that* . . .

. . . cuts either standard "taper" or electric "straight" conduit threads by a simple adjustment.

. . . has "radio" dial size-setting. Dies can be removed in a few seconds FROM THE OUTSIDE without use of tools.

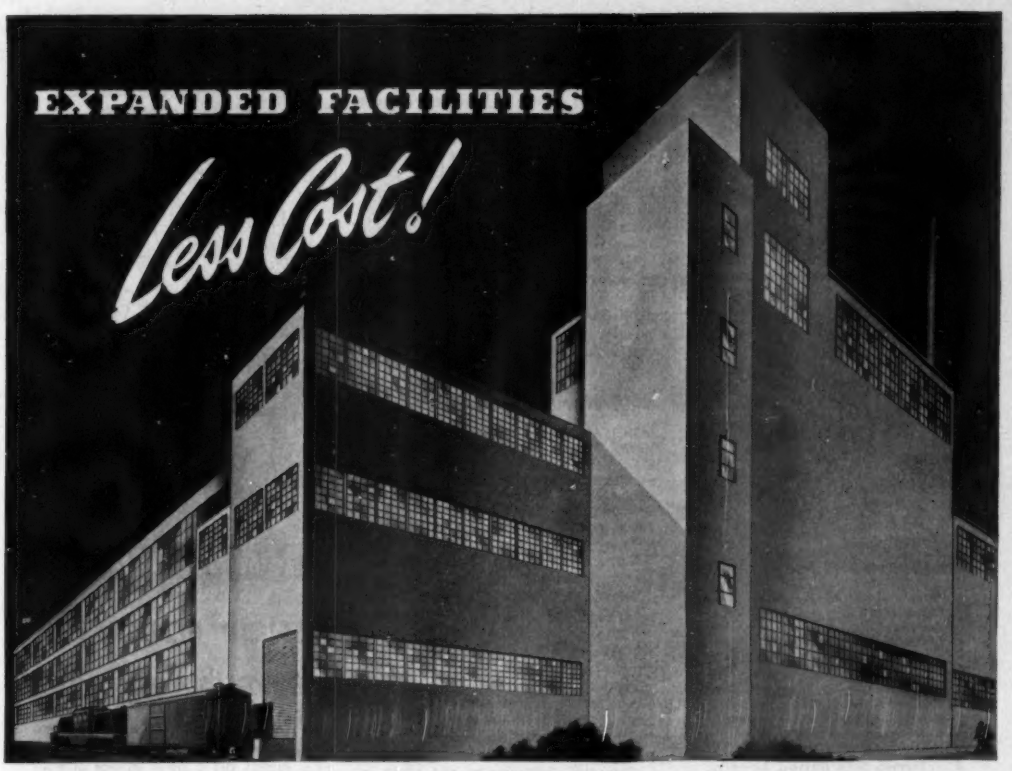
. . . is fully-adjustable and easy-working. The only 1 to 2-inch pipe threader that cuts standard, oversize and undersize threads of uniform standard length.

The Beaver 26-R uses one set of dies to thread four sizes—1, 1¼, 1½ and 2-inch. It is fully-adjustable for oversize or undersize threads to compensate for variation in fittings. There's a cam-type universal self-centering chuck, too, which centers the pipe accurately and insures straight pipe lines. Yet, "drip threads" may be cut when desired for heating lines.

Available at all leading supply houses—don't accept substitutes. Competitive in price!

SEND FOR BEAVER CATALOG NO. 51
Address Beaver Pipe Tools, Inc., 210-300 Dana Avenue, Warren, Ohio, U. S. A.

BEAVER PIPE TOOLS
210-300 DANA AVE. • WARREN, OHIO, U. S. A.



THESE commanding buildings house expanded facilities and utilities of a prominent manufacturer of heat insulating materials. They express the new vigor and growth of this concern which has now compressed a slow four-day process into the remarkably short time of only eighteen hours.

Such an achievement is a tribute to the engineering skill and ingenuity of the highly trained experts who accomplished this feat.

The Kuljian System of ***unified engineering and construction responsibility*** has again justified its outstandingly successful reputation in constructing this new plant which improves the product and increases profits for the owners. And—equally important—Kuljian has maintained design and construction schedules and completed this project in less time and at less cost than has been true of similar contemporary projects.

WASHINGTON, D. C.
CALCUTTA, INDIA
ROME, ITALY
CARACAS, VENEZUELA
MEXICO CITY, MEXICO

The Kuljian *Corporation*

ENGINEERS • CONSTRUCTORS

1200 NORTH BROAD STREET, PHILADELPHIA 21, PA.

This roof was *Saved* NOT REPLACED!

Timely inspection saved Superline Oils Ltd. the cost of a new roof at the Goodspeed & Davison Garage in Truro, Nova Scotia.

The Tremco Man with Mr. E. C. Baker, architect and engineer for Superline, inspected the roof. They found the roofing felts sound but dry. If neglected, the felts would disintegrate and an entirely new roof would be required.

Tremco Man Barton, however, stressed the need for *preserving* a dry but otherwise sound roof. Felts were resaturated with nonvolatile waterproofing oils and reinforced to insure added years of service. And then Tremco showed how its low cost methods really save money on the job . . .

ONE PUMP EQUALS 2 MEN AND 1 DAY

Tremco's labor and money saving Roofing Pump was brought on the job by Nova Scotia Waterproofing, Halifax contractors. Roofing materials were quickly pumped from barrels on the ground right to the point of application on the roof. The job which was scheduled to require 6 men for 5 days was actually done with 4 men in 4 days.

Where men and dollars count, Tremco Methods win approval. No matter how small or large your roof, invite the Tremco Man to inspect it and give you his recommendations.

Leonard Barton
Tremco Man
UM-1088

TREMCO
Products and Methods for Building Maintenance
THE TREMCO MANUFACTURING CO.
CLEVELAND, OHIO

as to predict and analyze groups of events in a business. The presentation is non-technical in nature and is written from a practical-application point of view, to serve as a guide for administrators who are interested in improving performance in their service, staff, and administrative activities—including financial, personnel, marketing, production, research and others.

Examples are given to prove the effectiveness of statistical control in both the non-manufacturing and manufacturing activities of a business. The cases given show how return-on-investment has been materially increased by the use of a statistical control program.

More on Statics and Kinetics

MECHANICS by James E. Boyd and Percy W. Ott. Third edition; size 6 by 9 in.; 422 pp including index and appendix; illustrated; cloth bound. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. Price $4.50.

THIS THIRD edition places emphasis on fundamental principles, examples designed to illustrate these principles, and problems to encourage the student to use logical thinking and suitable mathematical methods in their application.

Much of the material has been entirely rewritten for this edition. New problems have been added throughout the text, and these are generally more difficult than the original ones.

Several additions to the book include a new article on forced vibrations and resonance; a new chapter on moving frames of reference, which introduces the method of equivalent systems; the expansion of the treatment of virtual work; an extension of the work on systems of forces in space to cover simple space frameworks; and the addition of an article on the computation of moments in space by determinants.

Fuel Facts Feed Fires

FUELS AND COMBUSTION HANDBOOK, edited by Allen J. Johnson and George H. Auth. First edition, size 6¼ by 9¼ in.; 915 pp; flexible binding. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. Price $12.50.

THIS VOLUME was compiled from some 450 major references with the permission and cooperation of their authors and copyright owners. Every effort was made to use the most recent articles available with full consideration for their value.

The objective of this handbook is to present comprehensive factual data over the full range of commercial fuels for study by practical engineers, students of fuel and all others having an interest in the selection or use of fuels or fuel utilization equipment of any type.

DON'T GIVE UP!

HALLOWELL

SHOP EQUIPMENT IS worth waiting for...

Don't give up! In spite of shortages, restrictions and stepped-up demand, there's still a good chance of your getting that HALLOWELL Shop Equipment you want.

Just be sure to assign a "D. O." rating to your order, so that we can replace our steel!

And even if you aren't doing defense work, you'll very likely "rate a rating" under the latest N.P.A. Regulation governing Minor Capital Additions and Maintenance, Repair and Operating Supplies.

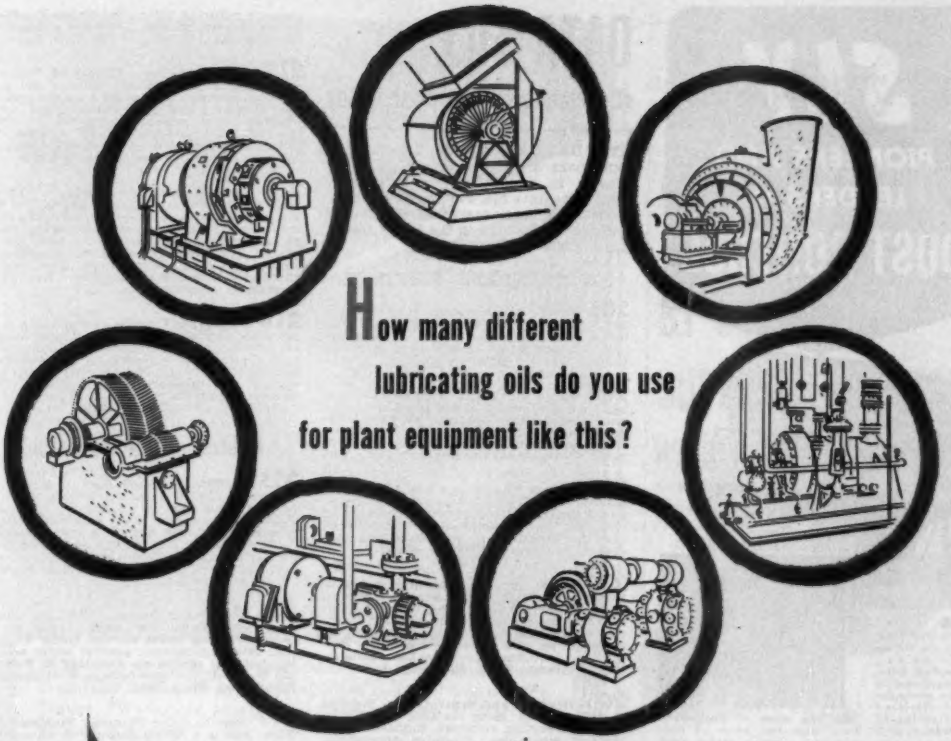
So we still say: "Don't give up!" You'll find HALLOWELL Shop Equipment's *extra strength, extra service,* and *extra value* well worth waiting for!

WRITE FOR LITERATURE

Work Benches	Posture Stools
Foreman's Desks	Posture Chairs
Tool Stands	Cabinets
Platform Trucks	Folding Tables

—SPS—

STANDARD PRESSED STEEL CO.
JENKINTOWN 24, PENNSYLVANIA



How many different lubricating oils do you use for plant equipment like this?

You need only one—

GULF HARMONY OIL

the outstanding many-purpose lubricant

for: Motors and Generators · Fans · Blowers · Pumps · Compressors · Hydraulic Mechanisms · Gear Units

Gulf Harmony Oil is a top quality many-purpose lubricating oil, ideal for sleeve-type bearings, oil-lubricated ball and roller bearings, hydraulic systems, compressor cylinders, and many types of gears.

Because of outstanding oxidation stability, Gulf Harmony Oil has exceptional resistance to sludging. In force-feed circulating systems, oil reservoirs, hydraulic lines, and antifriction bearings, the use of Gulf Harmony Oil helps prevent harmful deposits, insures fewer oil changes.

Gulf Harmony Oil provides a protective film which has preferential wetting characteristics for metal—it displaces moisture, interrupts its corrosive action. Thus Gulf Harmony Oil prevents rust on all oil-bathed surfaces—particularly important in antifriction bearings operating under damp conditions. And it separates readily from water, reducing the possibility of emulsification.

Its high lubricating value means more effective protection against wear under boundary conditions. Available in a wide range of viscosities.

For complete information on Gulf Harmony Oil and for expert help on any lubrication problem, call in a Gulf Lubrication Engineer today. Gulf Oil Corporation · Gulf Refining Company, Gulf Building, Pittsburgh 30, Pennsylvania.

FIFTY YEARS OF SERVICE
1901 GULF 1951
PETROLEUM AND ITS PRODUCTS

SLY

PIONEERS AND LEADERS IN

DUST CONTROL

Sly Dust Filter at the Walker China Co., Bedford, Ohio, prominent in the production of vitrified china for 25 years.

Two points of dust origin. Note hoods into which all dust-laden air is drawn, thence piped to Sly Dust Filter.

YOU, TOO, CAN BENEFIT BY SLY'S KNOW-HOW

Over 100 different kinds of dusts are being collected with Sly Dust Filters. Thousands of installations are in operation — they collect *all* the dust.

Sly Dust Filters are used on such difficult dust as powdered sugar, bentonite clay, paint and pigments, aspirin and other pharmaceuticals, chemicals of all kinds, talc, lime, detergents.

Designed and engineered so that they save on space and power, Sly Dust Filters require less attention, less maintenance, yet — they are not expensive.

We offer you the benefit of 50 years' experience in solving all kinds of dust problems. Let us solve yours. A Sly engineer is near you. Ask for Bulletin 98.

THE W. W. SLY MANUFACTURING CO.

4400 Train Avenue • Cleveland 2, Ohio

New York • Chicago • St. Louis • Philadelphia
Minneapolis • Birmingham • Cincinnati • Lansing
Los Angeles • Rochester • Toronto

DATA FILE

of literature for the plant library

STANDARD CATALOGS, bulletins and handbooks are listed to aid plant engineers in maintaining a permanent, up-to-date data file. For copies of these, write the number preceding the desired bulletin on the card in the heavy insert, pages 37-38 and 107-108.

PIPING, TRAPS, FITTINGS

201 How to Cut Steam Costs — Bulletin 250 tells how a differential drainage and boiler return system reduces steam costs. Layout drawings of installations included. Stickle Steam Specialties Co.

202 Steam Hook-ups—This 64-pp manual on hook-ups for steam traps, air vents and temperature controls provides diagrams, size calculations, selection data on traps and regulators, properties of saturated steam, dimensions. Sarco Co., Inc.

203 How to Choose and Use Air Traps—Bulletin 202 describes air trap selection and installation for automatic drainage of moisture from compressed air intercoolers, aftercoolers, receivers, separators and drip points. Armstrong Machine Works.

204 Steam, Air, and Gasoline Traps — Illustrated Catalog 250 describes several types of thermostatic steam traps, expansion steam traps, weight-operated traps for steam, air, gasoline, piston-operated steam traps, also steam, air and gas separators. Includes capacity tables, installation diagrams. W. H. Nicholson & Co.

205 Strainers and Separators — Bulletin R-46-50A is a 16-pp catalog on T-type strainers, suction strainers, multi-flow and receiver separators. Contains dimensions, weights, prices. Shows how several types have been redesigned for increased emciency. American District Steam Co.

206 Handbook on Fittings, Flanges—Catalog wf-1950, 88 pp. offers working information on seamless carbon steel welding fittings and forged steel flanges. Includes dimensional tolerances, thread standards and threading practice; service pressure ratings, physical and chemical requirements. Grinnell Co., Inc.

207 Unions and Fittings — Twelve-pp Catalog 50 covers manufacturer's line of unions of all types, elbows, tees and fittings. Describes special construction features. E. M. Dart Mfg. Co

208 Welding Fittings and Flanges—Catalog and Engineering Data Book 211, a 262-pp manual, provides complete dimensional data, weights and prices on company's welding fittings and flanges. Engineering section contains practical information on performance under varying conditions of temperature and pressure, location and materials processed. Technical section covers properties and rating of pipe, fittings and flanges, line expansion and flexibility, support and anchorage of piping. Tube Turns, Inc.

209 Small Pipe Markers — Bulletin 144 describes and illustrates, in color, self-adhesive pipe markers for identifying pipe and conduit. Sample marker included. W. H. Brady Co.

VALVES

210 Bonnet Valves—"Pressure-Seal" bonnet valves are described in Form AD-1819. Includes sizes, ratings, and tests for gate, globe, angle and stop check valves for high pressure and temperature service. Tells operating advantages. Crane Co.

211 Reducing Valve Engineering Data—Bulletin 962 explains how the contour of a pressure reducing valve contributes to emciency of performance. Discusses straight-line flow, tight closing. A. W. Cash Co.

212 Blow-off Valves — Illustrated Bulletin B-433, 24 pp, describes blow-off valves for high-pressure boilers, and covers seatless, hard-seat and unit-tandem types, for working steam pressures from 400 to 2500 lb. Construction details and operating principles illustrated, dimensions, specifications included. Yarnall-Waring Co.

213 Valve Maintenance Guide — "Prevent Valve Failure Before It Starts." is a 28-pp text on valve selection, installation, inspection. Pictures damaged valves, explains how damage could have been prevented. Discusses maintenance schedules, inspection jobs, lubrication, pipe line checking, threading, regrinding, disc replacement. Jenkins Bros.

214 Forged Steel Valves—Form 800-A illustrates and describes 600-lb forged steel valves for high line pressure and temperature applications. Covers both inside screw and OS&Y union bonnet gave types, giving dimensions, prices. Special features are described and chart shows trim metals to to specified. The Ohio Injector Co.

PUMPS, COMPRESSORS

215 Centrifugal Pump Care — Sixteen-pp Bulletin 08X6256A is a handbook on the care of all makes of centrifugal pumps. Tells how to figure head, determine friction loss. Discusses causes of troubles and their cures, includes maintenance time table. Tells how to prevent cavitation, common mistakes in packing stuffing boxes. Allis-Chalmers Mfg. Co.

216 Centrifugal Pumps — Single- and two-stage pumps for small boiler feed service, cooling tower service, bottle washing, brine circulation, general water service, hot well service are described in Bulletin W-306-B1. Includes ratings. Worthington Pump and Machinery Corp.

217 How to Solve Pumping Problems — Form 3060 is a 130-pp manual on selection, use of pumps. Tells type of pump construction best suited for handling 150 liquids. Explains how to determine size, compute suction lift and discharge head, determine direction of rotation and size or speed of pulleys or gears. Gives instructions for installing rotary pumps, locating trouble. Geo. D. Roper Corp.

218 Pump Catalog — Turbine type and centrifugal pumps for industrial pumping jobs are described in this 12-pp booklet. Discusses features. Aurora Pump Co.

219 Rotary Pumps—The operating principle, advantages, construction features and range of applications of standard, heavy duty and special rotary pumps are explained in illustrated Bulletin 51-S, 8 pp. Includes dimensions. Viking Pump Co.

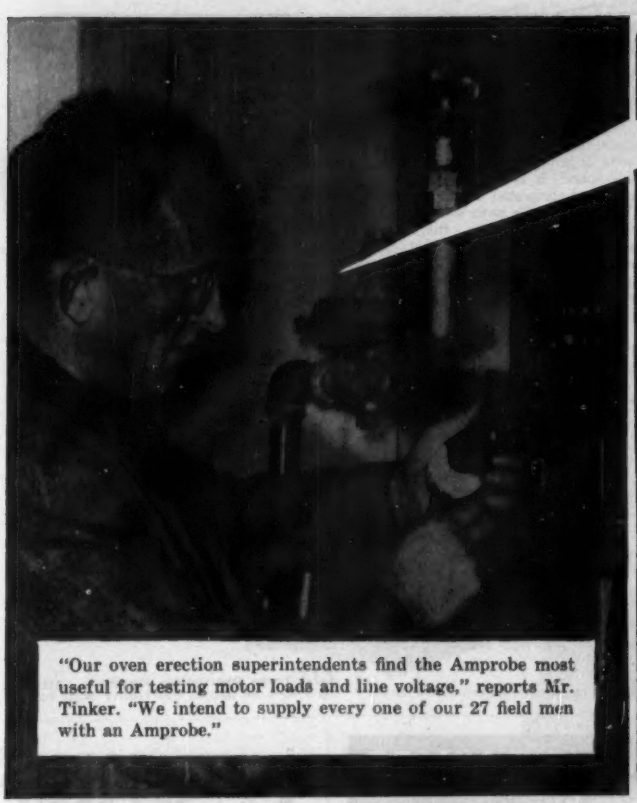
220 Centrifugal Pump—Bulletin 720.4, 8 pp, presents a single-stage, open-impeller type centrifugal pump, bronze fitted, designed for general water service, irrigation, circulation, slurries, transfer and factory wastes, other services. Gives specifications, bronze analysis, performance curves, dimensions. Goulds Pumps, Inc.

221 Centrifugal Pumps—Described and illustrated in Bulletin 50-9900 are a cross section of an extensive line of centrifugal pumps. Includes heavy-duty Bilt-on pump, a pneumatic sponge pump, deep well and submersible pumps, also boiler feed, process, stuffingboxless, and sump pumps. Byron-Jackson Co.

INSTRUMENTS, CONTROLS

222 Pressure Regulator—Bulletin 1-B, 8 pp, discusses design, operation and uses of a super-sensitive pressure regulator. Also covers a compound regulator for controlling back pressure relief valve and high pressure make-up valve. Atlas Valve Co.

223 Industrial Control Devices — Catalog 5303, 64 pp, presents 100 models of non-indicating electric, electronic, and pneu-



"Our oven erection superintendents find the Amprobe most useful for testing motor loads and line voltage," reports Mr. Tinker. "We intend to supply every one of our 27 field men with an Amprobe."

"20 AMPROBES ALREADY BEING USED BY OUR FIELD SUPERINTENDENTS" *writes W. G. Tinker,*

Service Manager,
The Petersen Oven Company,
Franklin Park, Ill.

$49.50 *complete with genuine top grain cowhide leather case and voltage test leads.*

OTHER AMPROBE USERS SAY:

"Very handy for a quick check on motor loads without any shut-down time."—*Ed. J. Wynne, Elec. Foreman, Walter Baker Division, General Foods, Dorchester 24, Mass.*

"The Amprobe is an essential piece of our testing equipment for checking transformers and motor currents."—*Milton H. Chase, Mgr., Homestead Utilities, Prudence Island, R. I.*

"It's the answer to a majority of trouble tests."—*A. R. Akins, Maintenance Foreman, G. S. Suppiger Co., 800 So. Morrison Ave., Collinsville, Ill.*

"Would not want to be without it."—*R. H. Heinze, owner, Heinze Refrigeration Company, 114 N. 15th St., Fort Dodge, Iowa.*

AMPROBE—THE SNAP-ON VOLT-AMMETER THAT FITS IN YOUR POCKET!

Reads current without interrupting circuit or breaking insulation

Look what you can do with this one pocket-size tool: Determine load conditions instantly without having to shut down equipment. Spot motor overloads and underloads. Diagnose trouble calls faster, under actual load. Check line voltage and drops. Set overload relays, etc.

- So compact, it fits in your pocket.
- ½ the usual size—only 7".
- ½ the usual weight—only 14 oz.
- Accuracy: ±3% (of full scale deflection).
- Field-proved and accepted — tens of thousands in daily use today.
- About ½ the usual price.

AMPROBE 10X SENSITIZER

Effectively gives the Amprobe 3 additional ranges: 0-1 AMPS. 0-2.5 AMPS. 0-5 AMPS. **$3.75**

Model A-6 measures 5 A.C. current ranges: 10/25/50/100/250 amperes; plus 2 A.C. voltage ranges: 150/600 volts. Two other models available.

AMPROBE®

A PYRAMID INSTRUMENT

See it today at the better electrical distributors

Send for this 16-page manual

PYRAMID INSTRUMENT CORP.
49 Howard Street
New York 13, N. Y. PE-4

Please send me your new 16-page Manual—"HOW TO MAKE YOUR JOB EASIER WITH AN AMPROBE."

Send literature on Amprobe Sensitizer and Split Plug.

(print your name, company and address in the margin)

matic controllers for flow, pressure liquid level and humidity applications. New instruments shown, include electronic temperature controllers. Illustrated, includes engineering data. Brown Instruments Div., Minneapolis-Honeywell Regulator Co.

224 **Time Saving Volt-Ammeter**—Manual 110, 16 pp, "How to Make Your Job Easier with the Amprobe," describes the handiness of this pocket-size volt-ammeter in installing, repairing, servicing and maintenance of electrical equipment. Pyramid Instrument Corp.

225 **Air Locks**—Bulletin S-31, 2 pp, describing air locks and trip master controls for holding regulating and control valves in position during failure of air supply, is illustrated with photos, diagrams, line drawings. The Swartwout Co.

226 **Handbook on Automatic Controls**—Catalog 700 provides 45 pp of ordering and application data on automatic controls with mercury contact switches. Covers control equipment for temperature, pressure, low water, liquid level, boilers; transformer-relays, control valves, mercury switches. The Mercoid Corp.

227 **Water Temperature Control**—How to regulate cooling water system of diesel and gasoline engines and air compressors with company's water temperature control is explained and illustrated in this bulletin. Regulators and dial indicating thermometers shown. The Powers Regulator Co.

228 **Technical Data on Controls, Control Valves**—Technical information and solution to problems involving pressure switches—or conversion of pressure or vacuum changes into electrical action. Data also given on four-way solenoid valves for control of air, water and light oil. Barksdale Valves.

229 **Electrical Instruments**—A line of instruments for production testing, plant maintenance and service is shown in 16-pp Bulletin A-16-B. Among these are a-c clamp volt ammeters and a-c clamp ammeters, circuit testers, analyzers, mutual conductance tubechecker, pocket-size meters, matched a-c and d-c portable instruments, also current transformers, light meters. Includes application information, ordering data. Weston Electrical Instrument Corp.

230 **Chemical Feed Systems**—Not a sales catalog, this 12-pp booklet presents an informative technical article covering dry and solution feeding, discussing the applications and potentialities of each. Illustrated text describes variations of main types of feeding, explains advantages, limitations, equipment required. Proportioneers, Inc.

231 **Liquid Density Meter**—A new direct-reading instrument for measuring liquid density is described in 8-pp Bulletin W-2. This meter uses a totally submerged, self-centering, chain-weighted plummet as its measuring element. Specifications, performance characteristics, installation drawings included. Precision Thermometer and Instrument Co.

POWER SCRUBBER

Applies the cleanser, scrubs, rinses and picks up—all in one operation

The Combination Scrubber-Vac, Model 418P, is a self-propelled, electric-powered unit with 18 in. brush ring. It is especially designed to meet the needs of small-area plants—2000 to 15,000 sq ft of floor space. It is also suggested for use in narrow aisles and congested areas.

Built to handle both wet and dry work, do steel-wooling, polishing, etc., the new Scrubber-Vac is said to clean floors in about one-third the time required by machines of this size using separate equipment for scrubbing and pick-up. The vacuum performs quietly and the unit incorporates same good design features as company's other combination machines. The Model 418P can be purchased or leased; details will be furnished on request. Dept. E. Finnell System, Inc., East St., Elkhart, Ind.

ELECTRICAL

232 **Motor Handbook** — Bulletin MU-185 provides 66 pp of engineering and descriptive data on motors, covering splash-proof and explosion-proof types, gear motors, motors for use in chemical plants, for oil well pumping, punch presses, elevators, cranes and hoists. Includes prices. Wagner Electric Corp.

233 **Power Distribution Feeders** — Catalog TEB-1, 40 pp, on heavy-duty units for

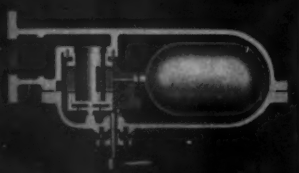
COCHRANE MULTIPORT DRAINER

(Continuous Flow Steam Trap)

CONTINUOUS DRAINAGE of low pressure condensate and HIGH DISCHARGE CAPACITY are features of the Cochrane Multiport Drainer that have made these continuous flow steam traps popular the world over.

Balanced Rotary Valve and large port areas permit instant response to great discharge demands. Valve opening is determined by height of water in float chamber. As volume of water increases, the larger the valve opening becomes.

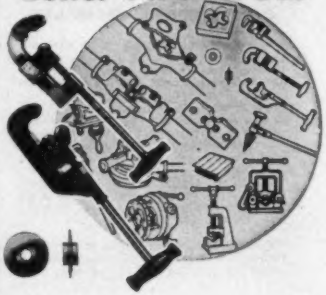
Other features: Valve never leaves its seat and is self-cleaning. Inlet at top prevents possibility of trap becoming air bound. Rotary Valve Seat is attached directly to float stem, one moving element. Write for Publication 4340.



COCHRANE CORP., 17th ST. & ALLEGHENY AVE., PHILADELPHIA 32, PA.

ARMSTRONG BROS.

Better PIPE TOOLS



PIPE CUTTERS

"ARMSTRONG BROS." Three wheel and Standard wheel and roller Pipe Cutters are quality cutters throughout . . . built to give years of good service.

"ARMSTRONG BROS." drop forged Pipe Cutters are built for lifetime service with 1-piece drop forged steel heat treated body and a replaceable hardened steel nut to take up the wear and thrust of handle screw. Used either as 1-wheel (with 2 rollers) or 3-wheel (for close quarters).

"ARMSTRONG BROS." Knife Blade Cutter Wheels are machined from special alloy tool steel properly heat treated. They cut rapidly and easily, hold their keen edge.

Write for Catalog

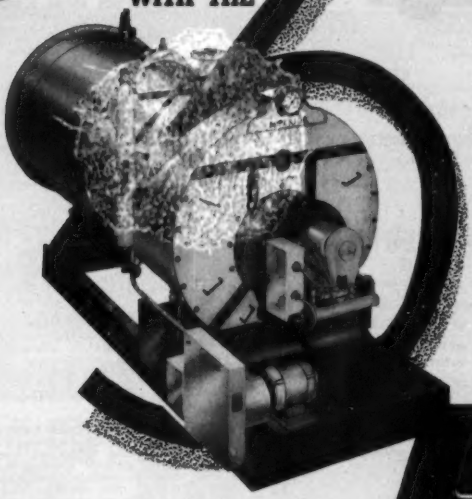
ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

3207 W. ARMSTRONG AVENUE • CHICAGO 30, ILL.

CAPACITY OPERATION *Easily*

WITH THE



Sq. Ft.

OF HEATING SURFACE
PER B.H.P.
IN EVERY

SUPERIOR
STEAM GENERATOR

A good steam generator doesn't have to be pushed . . . it attains its maximum rated capacity with ease. Superior Steam Generators do just this and at thermal efficiencies in excess of 80% under field operating conditions. One of the main factors contributing to their full capacity operation at high efficiencies is the five square feet of heating surface per b.h.p. in every Superior Steam Generator.

High efficiencies developed on the job result in lower fuel costs. These same high efficiencies developed easily without pushing the steam generator result in lower maintenance costs and longer boiler life. The final result of course, is lower steam costs.

There are other features which contribute to the outstanding performance of Superior Steam Generators . . . multiple-fan induced down-draft which is built-in, combined with Superior 4-pass construction for higher efficiency . . . large evaporating surface for quick steaming . . . large steam space and dry pan to assure ample reserve steam capacity and 99.5% dry steam at the nozzle . . . and many other important features, each painstakingly developed through experience and research, to make a Superior Steam Generator the unit to cut your steam costs.

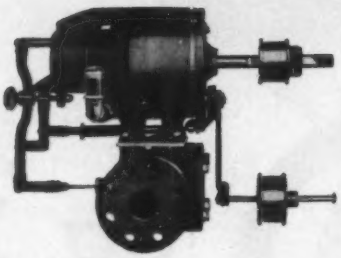
Superior Steam Generators are completely factory assembled, backed by undivided responsibility. Burn gas or oil, or both. Manufactured in 18 sizes from 20 to 600 b.h.p. for pressures up to 250 p.s.i. or for hot water.

Write today for the details in Catalog 305.

uperior ombustion ndustries, inc.

Factory, Emmaus, Pa.
Executive Offices: Times Tower, Times Square, New York 18, N. Y.

Providing Better Speed Control and Wider Speed Ranges for Steam Engines



TROY TYPE EN GOVERNOR

- ★ Up to 6:1 speed range
- ★ Fully enclosed, self-oiling
- ★ Ball bearings; no gears
- ★ Manual or Remote Control
- ★ Very precise in its setting
- ★ Setting holds regardless of load and steam pressure fluctuations
- ★ Straight line "setting vs. speed" characteristic

TROY ENGINE & MACHINE CO.
RAILROAD AVENUE TROY, PENNSYLVANIA
Established 1870

NO SCORE **for centrifugals in any inning . . . when you pack with** ***PALMETTO PALCO®!***

On centrifugals pumping water or handling any neutral fluid to 275 F, there's no chance of scoring pump sleeves if the packing is Palmetto Palco.

Palco won't score because it can't score. Built of cotton roving, each strand is separately saturated with a Palmetto lubricant that provides a *self-lubricating* packing. Friction created is negligible.

Available in coil or ring . . . plaited square to required sizes. Write today for full particulars on this and the full line of Palmetto packings for all industry.

GREENE, TWEED & CO.
NORTH WALES, PENNSYLVANIA

Contact your fully-stocked Palmetto distributor on all packing problems . . . ask him about our special tools.

main feeders in distribution system, gives construction, engineering, application data. The Trumbull Electric Mfg. Co.

234 Precision Switches—Twenty-pp Catalog 51 covers industrial switches for a-c circuits. Describes general purpose basic switches, auxiliary actuators, enclosed, explosion-proof and splash-proof types, limit switches, small switches. Includes technical data, prices. Micro Switch.

235 Electric Motor Lubrication Studies—Bulletin 1579 shows comparative amounts of lubricant in different designs of bearings, how bearings are subject to air circulation. Explains company's Lubriflush principle. U. S. Electric Motors, Inc.

236 The Why of Dry Type Transformers—Booklet B-4428, 24 pp, discusses reasons why dry-type transformers are safer and less expensive to install and maintain in industrial plants and utilities. Air-cooled transformers for every use are illustrated from small ones to power centers of 10,000 kva. Also describes sealed, submersible, dry-type transformers. Westinghouse Electric Corp.

237 Small Bus Duct—Detailed information on a midget-size bus duct is contained in Bulletin 703. Illustrates entire unit, also strap and hanger. Text discusses major parts, design features. Includes list prices. Frank Adam Electric Co.

238 Selector Switch Data — This folder of engineering information includes target sheet to aid in understanding company's push-pull selector switch. Features explanation on how switch provides single master control serving up to 16 operations. The Arrow-Hart & Hegeman Electric Co.

239 Distribution Duct Engineering Data—Bulletin 427-4 contains 32 pp of data for estimating ventilated duct for feeder circuits, plug-in duct, and plug-in duct for branch circuits. Includes instructions for laying out distribution duct jobs, and pointers on estimating, diagrams, layout symbols. BullDog Electric Products Co.

240 Plug-In Power — Sixty-pp Catalog 25 offers real help on electrical installation problems involving portable tools, materials handling equipment, cranes, hoists, cutting equipment. Covers a prefabricated trolley busway electrical distribution system to provide outlets for power or light where needed. Includes specifications, mounting data. Feedrail Corp.

241 Power Circuit Transformers — Bulletin 501-15, 12 pp, gives descriptive information on auto and double wound dry type power circuit transformers. Includes tips on converting, isolating service, selection, also wiring diagrams, dimensions. Jefferson Electric Co.

242 Buyers' Manual on Motors and Control—Fifty-pp Catalog GEC-1009 presents buying information on a carefully selected group of motors, motor starters, control accessories and electronic control. Ratings listed are those most frequently required. Excellent selection data is provided as well as full descriptions, dimensions, ratings and prices. General Electric Co.

243 Power and Control Cables—Sixty-pp Catalog 24 describes typical power and control cable designs and is intended as a guide in selecting proper wire and cable types. Describes insulations, sheaths and coverings, electrostatic shielding, and includes product data on all types listed. A technical section gives standard reel sizes and capacities, standard wire and cable specifications. Rome Cable Corp.

244 Retractile Cords—Bulletin KKG describes and pictures some of the applications for permanently coiled, neoprene jacketed electric cords which expand to about 5 times their retracted length. Koiled Kords, Inc.

MECHANICAL POWER TRANSMISSION

245 Chain Drive Manual—Catalog SCE-50, 68 pp, on chain drives, cites advantages and recommends applications. Gives in-

Porcelain processing operations get a lift with

LO-HED HOIST

A PRODUCT OF AMERICAN ENGINEERING COMPANY

LO-HED CAR PULLER is electrically driven... enables you to move railroad cars on your siding cheaply and safely... cuts demurrage costs ... And it's a money-saver *inside* a plant; pulls anything within its capacity that can slide or roll.

VISIT BOOTHS

4TH NATIONAL MATERIALS HANDLING EXPOSITION INTERNATIONAL AMPHITHEATRE CHICAGO 1951

ONE OPERATOR and a Lo-Hed Hoist handle a big production volume... move loaded racks in and out of a dozen pickling tanks at the General Porcelain Enameling & Mfg. Co. plant in Chicago. As illustrated, this application employs an underhung, hand-geared twin-hook crane and a Lo-Hed Hoist with a twin-rope hookup. All controls are right at the operator's hand. Installation was engineered and furnished by Chicago Tramrail Corporation.

Lo-Hed brings you maximum service life and lowest maintenance cost. With A.C. push button operation, the transformer protects operators. Because of "balanced design" Lo-Hed can lift your loads higher. It has a shrouded bottom block... hook is suspended on a revolving bearing.

Lo-Hed Hoists are made in five suspension types and in capacities ranging from ½ ton to 12 tons. Mail coupon today for complete information.

LO-HED MEANS LOW OVERHEAD

AE

AMERICAN ENGINEERING COMPANY

PHILADELPHIA 25, PENNA.

Products are: Taylor and Perfect Spread Stokers, Marine Deck Auxiliaries, Hele-Shaw and Hydramite Fluid Power, Lo-Hed Hoists, Lo-Hed Car Pullers.

American Engineering Company
2503 Aramingo Avenue, Philadelphia 25, Pa.

Gentlemen: Kindly send me full information about ☐ Lo-Hed Hoists... ☐ Lo-Hed Car Pullers.

Name_____ Title_____

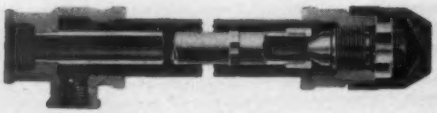
Company_____

Address_____

City_____ Zone____ State_____

ONLY 1 MOVING PART

in Nicholson Expansion Steam Traps



Remarkably Low Maintenance Costs Shown on Many Varied Installations

There is not a pin, not a bearing, not a link nor a lever to wear in this Nicholson expansion steam trap. The valve is the only moving part. This extreme simplicity is resulting in remarkably low maintenance costs. There are hundreds of instances of traps in continuous service for as much as two years without even a sign of valve cutting.

Appreciable fuel savings are also being effected. Traps are easily adjusted to pass condensate at any temperature below 212° F, instead of at near steam temperature.

Easily installed, often without supports. Lengths, 18" to 40". Pressures, 0 to 250 lbs. No air binding.

FOR ALL EQUIPMENT Using Steam or Hot Water

Radiators	Dry Kilns
Separators	Vulcanizers
Paper Machinery	Switch Heaters
Pipe Coils	Laundries
Kettles	Plastic Molding Presses
Railway Coaches	

Catalog 250 or see Sweet's

W. H. NICHOLSON & CO., 208 Oregon St., Wilkes-Barre, Pa.

One Sure Way to CUT COSTS!

use a C•F SHEET LIFTER

The A. B. Dick Company, Niles, Illinois, found that this C-F Lifter has substantially reduced man hours and crane time required to move stock in and out of storage.,

Up to 10,000 lbs. of high grade sheets in varying widths may be picked up, carried and unloaded at shears or machines with speed and economy by the Lifter and its operator.

C-F Lifters are made in standard or semi-special models to handle from 2 to 60 tons. Bulletin SL-25 describes the advantages you can obtain from C-F Lifters. Write for it today.

CULLEN-FRIESTEDT CO.

1317 South Kilbourn Avenue • Chicago 23, Illinois

formation on chain length calculations, installation and maintenance, ratings, chain types, pitch and sprockets. Includes prices. Whitney Chain & Mfg. Co.

246 Steel Shaft Data — Bulletin G-7, 20 pp, contains formulas, curves and tables for determining proportions, stresses, combined torsional and bending loads in round, square, hollow, keyway and stepped shafts. IMO-DeLaval Products Div., DeLaval Steam Turbine Co.

247 Brakes and Brake Motors—Construction advantages of company's brakes are featured in illustrated Bulletin SL-610-1 on brakes and brake motors. Explains greater wear resistance afforded by bonded metal brake linings. Dimensions, mechanical and electrical characteristics, mounting data. Crocker-Wheeler Div., Elliott Co.

248 Longer Life for Bearings — Bulletin 37B describes an economical three-step metallizing process which provides hard, oil holding surfaces for new and worn bearings. Metallizing Engineering Co., Inc.

249 Manual on Power Transmission Machinery — Containing 225 pp of data, this illustrated handbook covers roller bearings, V-belt drives, friction clutches, couplings, collars, sleeve bearings, pulleys, take-ups and hangers. Provides engineering, selection, ordering information: includes formulas. Dodge Mfg. Corp.

250 Power Drive Handbook — Catalog 709, describing roller chains and sprockets, includes tips on selecting stock roller chains for every type of power drive service. Diamond Chain Co., Inc.

251 Hydraulic Couplings — Bulletin 3924 is a 24-pp collection of advertisements on use of hydraulic couplings in power plants. Feature on-the-job interviews and show increased plant efficiency afforded by use of fluid drives. American Blower Corp.

252 Handbook on Chains and Sprockets —An excellent reference book is 216-pp Catalog A418. Discusses various chains and their service applications, metals used in them, and factors affecting their efficiency. Gives selection information on chains for drives and for elevators and conveyors. Engineering data includes dimensions, strengths and weights on a wide range of chains, sprockets and attachments. The Jeffrey Mfg. Co.

253 Variable Speed Control Simplified—Bulletin 700 contains some 40 pp of descriptive, application and engineering data on variable speed pulleys and selective speed transmissions. Illustrations show how old and new machines can be equipped with efficient variable speed control. Lovejoy Flexible Coupling Co.

254 Variable Speed Control — Twelve-pp Bulletin G-500, 12 pp, describes basic operating principle of company's variable speed drives and contains representative rating tables and dimension drawings. Covers capacities from ¼ to 87 hp with stepless speed changes within ratios from 2 to 1 to 16 to 1. Presents three basic units and controls. Reeves Pulley Co.

MATERIALS HANDLING

255 For Efficient Overhead Handling — Bulletin C-1, 56 pp, pictures overhead equipment for practically all industries. Stresses construction, safety, electrical advantages of trolleys, cranes, track and auxiliaries. The American MonoRail Co.

256 Handling Equipment Ordering Book —Ninety-pp Catalog 23 describes power trucks, power jacks, stackers, cranes, hand trucks, platforms, storage racks. Fully illustrated. Lewis-Shepard Products, Inc.

257 Manual on Electric Hoists — Catalog H-46, 44 pp, covers monorail and stationary hoists and car pullers. Explains fundamental types of grabs, methods of hanging I-beams, types of hoist suspension, controls; gives dimensions. American Engineering Co.

258 For Overhead Moving — This is a 12-pp booklet of engineering and applica-

"HET UP" about YOUR wasteful heating SET UP?

Why not change to

THERMOLIER

UNIT HEATERS

If you're dismayed about *last winter's* high-cost-of-heating, how about next year — when it may be as hard to get *fuel*, as it was for you to get *heat* this year?

Here's a red-hot tip. To save heat and fuel, install Thermolier Unit Heaters. But don't delay. Material shortages can seriously disrupt the production of unit heaters. In addition, skilled men are available to make installations now. They may not be in the days ahead. Study these Thermolier Unit Heater advantages — *and act promptly.*

HEATING COMFORT Thermoliers provide quick heating from a cold start. Desired room temperatures are easily maintained within a close range.

LOW FIRST COST Thermoliers are so efficient and so compact that their heating capacity is often equivalent to the capacity of cast iron radiation or pipe coils of twice the cost.

ECONOMY OF OPERATION Heat is forced down to the working level . . . not banked uselessly at the ceiling level.

ADAPTABILITY TO EQUIPMENT AND FLOOR LAYOUT Thermolier unit heating is widely used in industrial plants and warehouses, garages, stores and public buildings. The units and the simple piping are overhead where they do not interfere with arrangement of the operating machinery or equipment.

THERMOLIER CONSTRUCTION FEATURES THAT SAVE MONEY

Use of plain thermostatic trap, the simplest and least expensive kind of trap, is practical because of Thermolier's exclusive internal cooling leg.

Maximum capacity provided at all times and annoying, destructive water hammer eliminated by built-in pitch of tubes and internal cooling leg which assures continuous drainage of condensate.

Damaging strains caused by expansion and contraction eliminated by "U" type expansion tubes.

Safety and durability assured with leak-proof tube-to-header construction.

Eight other important features. Write for Thermolier Catalog.

Horizontal Delivery | Textile Model | Velocity Nozzle | Vertical Delivery

GRINNELL

WHENEVER PIPING IS INVOLVED

GRINNELL COMPANY, INC., Providence, R. I. Warehouses: Atlanta • Billings • Buffalo • Charlotte • Chicago Cleveland • Cranston • Fresno • Kansas City • Houston • Long Beach • Los Angeles • Milwaukee • Minneapolis • New York Oakland • Philadelphia • Pocatello • Sacramento • St. Louis • St. Paul • San Francisco • Seattle • Spokane

tion data on tramrail equipment, telling how it can improve plant's handling methods. Shows system's rail and arch design, switches, cranes and transfer bridges, hand-operated carriers, hoists, cranes, buckets, grabs. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

259 Handbook on Overhead Conveying Systems — Manual A-56 provides 200 pp of information on overhead track systems and conveying equipment. Pictures installations, construction details; gives engineering and application data. Richards-Wilcox Mfg. Co.

260 Trucks, Casters, Wheels — Catalog 50, 64 pp, covers platform trucks, superstructures, two-wheel and pry trucks, dollies, trailers, casters, wheels, offering a wide range of chassis, superstructure and wheel combinations. Thomas Truck & Caster Co.

261 Portable Hoists — This bulletin describes a lightweight air hoist in 2000, 1000, 500 and 300-lb capacities. Gives specifications, dimensions, operating advantages. Keller Tool Co.

262 Fastenings for Conveyor Belts — This collection of data covers hinged fastenings, repair plates, lacings, hooks, round belt couplings, also lacers, cutters. Gives instructions for use. Armstrong-Bray & Co.

263 Fast-Working Hoists — Bulletin W-815-B, 6 pp, provides electrical details on company's hoists — on wiring, brakes, motors and fast-operating, push-button controls. Standard, outrig, and multi-speed controls, limit switches are described. Hoist & Crane Div., Robbins & Myers, Inc.

264 Specifications on Handling Equipment — Form TC-44, 8-pp, gives basic specifications on forklift trucks, both gas-powered and electric, on solid and pneumatic tires; industrial towing tractors; Tructractors for bulk materials. Industrial Truck Div., Clark Equipment Co.

265 Conveying Systems Manual—Unloading and conveying of dry pulverized material are discussed in 24-pp Bulletin FK-25. Text covers system and operation; stationary pump, accessories. Fuller Co.

266 Lifting Equipment—Bulletin 445 describes and illustrates hand-operated platform lifting devices in both light and heavy duty types, with capacities from 500 to 2000 lb. Economy Engineering Co.

267 Conveyor and Elevator Belts—This 36-pp collection of catalog sections illustrates parts used in construction of company's conveyor and elevator belts. Discusses features, increased service life and decreased maintenance. Covers cord, material, hot material, food handling conveyor belts, grain conveyor and elevator belts, industrial elevator belts. The B. F. Goodrich Co.

268 All-Around Bulk Handler—Literature is available on company's Dumpster, a truck-mounted carrying and dumping unit which does the work of several trucks by means of interchangeable containers. Shows how different containers handle a wide range of bulk materials, solids, liquids, dusts, etc. Dempster Bros.

269 Single Drum Hoist—Sixteen-pp Bulletin 76-X describes single-drum, portable multi-purpose hoists for industrial plants, construction work. Gives specifications for hoists with capacities from 500 to 3500 lb and driven by company's Turbinaire, Pistonaire, electric or gasoline engines. Selection chart included. Joy Mfg. Co.

270 Metal Conveyor Belts — This 24-pp booklet is an illustrated guide to selection of metal conveyor belts. Presents both conventional and balanced spiral weave belt; covers raised edge and flight constructions, chain edge constructions, high temperature belts, wire conveyor aprons. Includes photos, data on weaving limits, weight, mesh openings, take up for wire conveyor belts. Wickwire Spencer Steel Div., The Colorado Fuel and Iron Corp.

HEAT INSULATION

Of hydrous calcium silicate, now made in curved blocks

These blocks are latest addition to company's wide range of sizes and thicknesses in this insulation, which is intended for use with temperatures to 1200 F. The range covers tubes and pipes from ¼ to 72 in. dia. and vessels to 60 in. As pre-formed pipe covering it is made in sectional

form (two pieces to the circumference), for the smallest pipe diameters, and in tri-segmental, quad-segmental, K-segmental (curved pieces 18 in. wide) for larger sizes.

This lightweight pipe covering is made to simplified dimensional standards so outside diameters of coverings correspond to outside diameters of standard pipes. Kaylo Div., Owens-Illinois Glass Co., Box 1035, Toledo 1, O.

QUICK REPAIR
for BROKEN CONCRETE FLOORS

TAMP SMOOTH! TRUCK OVER!

Use durable INSTANT-USE . . . a tough plastic material which you simply shovel into hole — tamp — and run traffic over immediately. Tough INSTANT-USE is ideal for repairing cracks and breaks due to relocating machines . . . or for complete overlays. NOTE: Plasticizer makes INSTANT-USE easy to scoop out of container . . . easy to level, to tamp, to use! *There's a Flexrock material for every floor condition—oil, acid, wet, dry! Tell us your problem!*

MAIL COUPON FOR FREE TRIAL OFFER AND HAND BOOK OF BUILDING MAINTENANCE

INSTANT-USE

FLEXROCK COMPANY Offices in principal cities
3615 Cuthbert St., Philadelphia 4, Pa.

Please send me complete INSTANT-USE information, details of TRIAL ORDER PLAN and HAND BOOK OF BUILDING MAINTENANCE — no obligation. (Clip and attach Coupon to Co. letterhead)

Name .....
Company .....
Address .....

QUICKLY BEND PIPE OR CONDUIT EXACTLY AS YOU NEED IT!

Make tailor-made bends *right on the job* with a GREENLEE Hydraulic Pipe Bender. One-man operated . . . in but a few minutes produces smooth, accurate bends in pipe up to 5", rigid and thin-wall conduit, tubing. Compact, easy to set up and operate. Great time-saver for making piping and electrical installations either on machines being produced or for your plant maintenance and construction.

GREENLEE

WRITE FOR FACTS, get complete information on this and other GREENLEE time-saving tools. Greenlee Tool Co., 1884 Harbert Ave., Rockford, Illinois

LUBRICATION ECONOMY

"LUBRIPLATE No. 630-AA is Practically a Universal Lubricant"

The Spokane Portland Cement Company of Irvin, Washington writes, "With the introduction of LUBRIPLATE No. 630-AA we reduced the number of lubricants we were using from ten to two. LUBRIPLATE No. 630-AA might almost be considered a *UNIVERSAL LUBRICANT*".

1. LUBRIPLATE reduces friction and wear
2. LUBRIPLATE prevents rust and corrosion
3. LUBRIPLATE is economical to use

Write today for case histories of savings made through the use of LUBRIPLATE in your industry.

LUBRIPLATE DIVISION
Fiske Brothers Refining Co.
Newark 5, N.J. Toledo 5, Ohio

The Different LUBRICANT!

DEALERS EVERYWHERE, consult your Classified Telephone Book

COVER PIPES, TANKS, WALLS

NoDrip

Anyone can brush, trowel or spray NoDrip on any clean, dry surface. Goes on like plaster, forms a seamless, protective coating. *Stops condensation drip.* NoDrip keeps equipment and floors safe and dry; prevents corrosion of metal and prolongs its life. Acid, alkali and brine resistant. Comes in 1, 5 and 55 gal. drums, ready for use.

TRY NoDRIP

Apply NoDrip to a small area, compare the results with uncovered portion.

Send for free NoDrip Handbook

J. W. MORTELL CO.
537 BIRCH SREET KANKAKEE, ILL.

Tilting Loading Dock Ramps

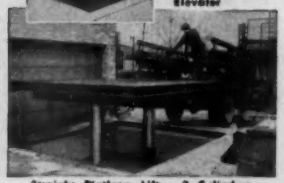
Straight Platform Lift with Full Skirt Electric Pump Operated

Wayne Lift in Newspaper Plant

Wayne Sidewalk Elevator

Cut Handling Costs

BETTER material handling offers industry its biggest opportunity to cut production costs and to increase productivity. Investigate what it can do for you. Let Wayne engineers help you develop the proper equipment to assure better handling of material in your plant. There's a Wayne Hydraulic Lift for every requirement. Write for more information.



Straight Platform Lift — 2 Cylinders Platform Lift Air/Oil Operated

WAYNE INDUSTRIAL HOISTS

MAIL NOW FOR MORE FACTS

THE WAYNE PUMP CO. • FORT WAYNE 2, IND.
516 TECUMSEH STREET

Please send folder and complete information on Wayne Industrial Hoists. Type_____

NAME _____ ADDRESS _____

CITY _____ STATE _____

AIR COMPRESSORS • HOSE REELS FOR OIL, GREASE, WATER, AIR • BULK PUMPS

271 Data on Truck Casters—As much specific information as can be presented in a catalog for commercial usage is included in 105-pp Catalog 124 on truck casters. Besides specifications, ordering data and photos, this well-indexed book includes load capacity charts, defines caster terminology, tells how to select casters and install them. Covers casters for light, medium, and heavy duty, sprung wheel casters, track casters, special types, wheels, locks and brakes. The Bassick Co.

272 Hydraulic Jacks—Hand, wheeled and gage-equipped jacks from 1½-t capacity models to 100-t capacity extra-heavy duty jacks are covered in Catalog J-50, 16 pp. Illustrated, includes specifications, selection information. Explains construction features. Blackhawk Mfg. Co.

273 Sheet Lifters—Operational and design features of company's sheet lifting equipment which contribute toward efficient handling, flexibility and economy are explained in Bulletin S-23, 16 pp. More than 80 installation photos show sheet lifters in use, also lifters for tinplate, coiled stock, special jobs. Includes dimensions for standard and low head room lifters. Cullen-Friestedt Co.

CONSTRUCTION

274 Roofing Manual — Engineering data on roofing is given in Specifications 50, 30 pp. Covers coal tar pitch roofings, waterproofings, insulations, flashings, protective coatings. Includes illustrated instructions. Tar Products Div., Koppers Co., Inc.

275 Building Panel Engineering Data — This 40-pp reference book on use of steel and aluminum panels for walls, decks and roofs, discusses their use, advantages, methods of installation. Covers acoustically treated panels, fire resistance ratings, electrification, acoustic roofs, reinforcing floor forms. Fenestra Building Products Co.

276 Glass Block and Where to Use It—This 32-pp book gives design data, information on functional and decorative aspects of glass block. Covers properties, specifications, erection procedures. Insulux Div., American Structural Products Co.

277 Walkways and Loading Racks — Part I, Section 6 of Catalog 54, 36 pp, gives application suggestions on pre-cut steel material for on-the-job erection into walkways, stairways, loading racks; instructions, layouts. Black, Sivalls and Bryson, Inc.

278 Technical Data on Plexiglas — This is a file folder of information on Plexiglas sheets, rods, molding powders, covering workability, properties, thicknesses. Discusses large area lighting. Rohm & Haas Co.

279 Let's Consider Aggregate — Bulletin 701 is an excellent 12-pp discussion of aggregate, telling what good aggregate consists of and giving recommendations for its use in producing good concrete. Illustrated throughout. Walter Maguire Co., Inc.

280 Building Construction and Maintenance Manual—Here's a 112-pp illustrated manual packed with facts on concrete and wood floor treatments, paints, protective coatings, concrete and mortar admixtures, waterproofing and dampproofing, caulking compounds, and roof coatings. Indexed, estimating guides on floor treatments and roof coatings, brick requirements, timber requirements and watercement ratios. L. Sonneborn Sons, Inc.

281 Overhead Door — This bulletin describes an improved overhead door which rolls up and back, above and away from doorway. Illustrations show how door is designed, constructed. Barber-Colman Co.

282 Technical Manual on Plywood—Available basic data on Douglas fir plywood, its properties and use, are offered in looseleaf sections with firm binder. Presents engineering information about this panel material and its performance in varying applications. Covers commercial standards, designing with plywood, prevention of condensation, lateral bearing strength of nailed plywood joints, deflection. Additional sections, issued as wider technical data are amassed, will be sent to those who receive the handbook. Please give your title when requesting it. Douglas Fir Plywood Association.

283 Fastening Tips—This recent issue of company's house organ relates some interesting case histories on the use of company's fastening system. Also describes a new safety shield and dual-action tool. Ramset Fasteners, Inc.

MAINTENANCE

284 Drip Preventive Handbook — Insulation of pipelines, tanks, cold air conditioning ducts and wall surfaces against corrosion and condensation drip is covered in pocket-size 32-pp Form P-17. Describes coatings, tells how to apply. Includes coverage tables. J. W. Mortell Co.

285 Painting with Aluminum — Form AD-228, 28 pp, tells how and where to use aluminum paints. Covers painting of metal, concrete and masonry and other nonabsorbent surfaces; of weather-exposed wood, and of interior heated surfaces. Aluminum Co. of America.

286 Iron Cement Handbook — This is a 40-pp pocket-size catalog of iron cements for repair, other uses. Tells how to mix and apply them. Gives illustrated instructions for dozens of repair and maintenance jobs. Smooth-On Mfg. Co.

287 Adjustable Scaffolds — Lightweight, aluminum alloy scaffolds with adjustable legs and built-in safety factors are described in this bulletin. Shows how easily scaffolds are carried and erected. Up-Right Scaffolds Div., Up-Right, Inc.

288 Building Maintenance — Handbook 7, offers 64 pp of information on floor surfacings, leak stoppers, external wall sealants, road patching, roofing materials. Includes instructions for use. Flexrock Co.

TORNADO®

Wet or dry—positive pick-up!

Vacuum Cleaner

For over 30 years, Tornado has been used in hundreds of industrial plants, hotels, restaurants, hospitals, schools and other institutions. Tornado saves time, cuts maintenance costs, can be operated by inexperienced personnel. Sturdy, lightweight, gives years of trouble-free service. Quickly adaptable to any cleaning chore. Free demonstration—write for name of nearest representative.

FREE! Bulletin 600-P

BREUER ELECTRIC MFG. CO

5100 N. RAVENSWOOD AVE. · CHICAGO 40, ILL.

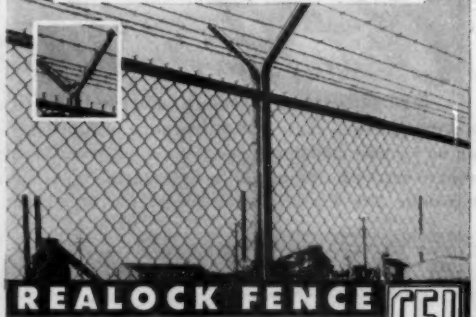
REALOCK

PROTECTION PLUS

▶ All fittings, hinges and locking devices have bolts *on the inside*, secure from tampering.

▶ Heavily galvanized by a special process, Realock Fence is weather-resistant, extra strong and durable…costs little or nothing for maintenance. Supplied only with malleable base with pressed steel arms (inset) in the East.

For complete details refer to Sweet's Catalog. For free estimate consult your classified telephone directory—or write direct.



REALOCK FENCE

WICKWIRE SPENCER STEEL DIVISION 361 Delaware Ave., Buffalo 2, N.Y.
THE COLORADO FUEL & IRON CORP. Continental Oil Bldg., Denver 2, Col.
THE CALIFORNIA WIRE CLOTH CORP. 1000 - 19th Avenue, Oakland 6, California

CF&I

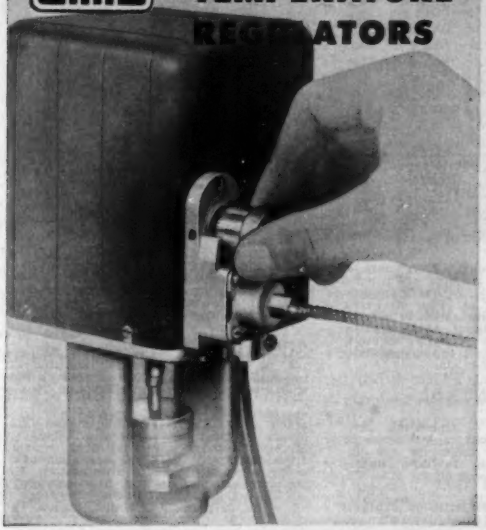
BRANCHES & DISTRIBUTORS IN KEY CITIES EVERYWHERE

the new

BARBER COLMAN

self-contained
electrically operated

TEMPERATURE REGULATORS



Featuring!

CALIBRATED dials
and
TIGHT CLOSING

TWO MODELS—Standard Sizes

Model ADFE for 1/2" to 2" pipes (6 sizes). Positive *motor-driven* power operator closes valve *tightly*. Delivered completely assembled, ready for installation. Temperature range, choice of 50°-130° or 120°-200°F. with *calibrated dial.*

Model FYBE for 3/4" to 4" pipes (8 sizes). Has heavy-duty motor-operator for installations involving higher pressures and larger capacities. Both models connect direct to 60-cycle A.C., 115 or 230-volt as specified.

for HOT WATER STORAGE TANKS
BOTTLE WASHERS
BATCH KETTLES
and other two-position on-off applications

Write for Literature
Ask for Bulletin 7-4695

BARBER-COLMAN COMPANY
1237 ROCK STREET • ROCKFORD, ILLINOIS

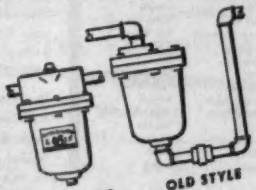
BARBER COLMAN

Save 7 Fittings per Steam Trap

FITTINGS

are getting as scarce as HENS' TEETH

Yes, fittings are becoming as scarce as hens' teeth. Here's a timely solution to help you make your pipe fittings go farther. Anderson's book "Solving Steam Trap Problems" tells how engineered Super-Silvertop steam traps simplify piping. They can be installed straight-in-line or as an elbow *saving up to 7 fittings* over conventional trap installations. In addition, this book tells how Super-Silvertops can be serviced *without disturbing a single fitting.* Save fittings, time, and money by mailing coupon for your copy of this book today.



SEND FOR FREE BOOK NOW!

THE V. D. ANDERSON COMPANY
1939 West 96th Street • Cleveland 2, Ohio

Gentlemen: Please send me a copy, without cost, of your 36-page book, "Solving Steam Trap Problems."

Name _____

Address _____

City _____ State _____

In Canada: Beaudin Machine Co., Toronto

289 **Before Your Next Paint Job**—Catalog F5136 offers plant engineers many a helpful hint on points to be considered before undertaking a paint job. Illustrated with photos and sketches, covers such factors as principles of contrast control and how to apply them, keeping costs down, exterior painting. The Tremco Mfg. Co.

290 **What's Your Corrosion Problem?**—This small folder on rust preventives for protection of metal surfaces presents both the oil film and petrolatum types, telling how each is used, giving recommended uses. Gulf Oil Corp., Gulf Refining Co.

291 **Power Brushes**—Bulletin C-269, describing company's new line of power brushes, contains photos showing their design and use. Ordering instructions, specifications included. The Osborn Mfg. Co.

292 **Protective Coatings** — This bulletin offers concise information on Gilsonite- and mica-based coatings for protecting heavy industrial equipment against corrosion, and sealing walls. Discusses general properties; includes selection table covering more than 25 coatings, giving applications, special features, coverage. Insul-Mastic Corp. of America.

AIR CONDITIONING, VENTILATING

293 **Improved Air Conditioning**—Advantages and applications of a controlled humidity method of air conditioning are discussed in Bulletin 112. Process is explained, illustrated. Niagara Blower Co.

294 **How Conditioning Units Can Help** —The advantages of self-contained units in cooling, dehumidifying, cleaning are cited in 40-pp Catalog 1301. Explains installation, operation. Provides data on direct expansion and cold water cooling, hot water, steam heating. Clarage Fan Co.

HYDRAULIC PULLER

For doing almost any pulling or pushing job quickly

The compact Power-Twin weighs less than 10 lb, develops 15 t of power and is only 5½ in. high. It works in any position, company points out, and has a center hole and twin-cylinders, which enable it to get at jobs formerly inaccessible with hydraulic ram. The ram travels 2 in., adequate for most pulling jobs, another bite takes care of the rest.

The remote control pump develops 10,000 psi. Six ft of pressure hose allows operator to stand a safe distance from work, and wire guards protect hose. Couplers are tested for 24,000 lb. Owatonna Tool Co., 446 Cedar St., Owatonna, Minn.

295 **Heavy Duty Ventilation Filters** — Form DPF-100. LH presents a dry-panel filter with a filtering area of 23 sq ft Tells features, uses; includes installation data, filter selection chart. Dollinger Corp.

296 **Weatherproof Power Exhausters** — Featured in this 8-pp bulletin are direct-drive exhausters so designed that the motor is out of the line of air flow to avoid damage by moisture and corrosive fumes. Engineering data includes recommended average air changes, air velocities required for exhaust hoods, rating table, specifications, uses. The Gallaher Co.

DUST CONTROL

297 **Dust Collectors — Operation,** construction, versatility and maintenance of company's unit dust collectors are explained in this bulletin. Includes capacities, sizes. The Kirk and Blum Mfg. Co.

298 **Dust Control**—Bulletin 98 explains value of industrial dust control and principles of dust suppression, collection by filtration. Describes dust control equipment, providing specifications, dimensions on filters, systems, automatic controls. The W. W. Sly Mfg. Co.

299 **Electric Blowers** — Illustrated Bulletin 373 describes portable electric blowers in ⅓ to 1½ hp sizes for removing dust, dirt, grit and grindings from motors, bearings, gears. Breuer Electric Mfg. Co.

300 **Vacuum of Many Jobs** — Bulletin 144, 20 pp, describes and illustrates 132 unusual industrial uses for company's vacuum system. The Spencer Turbine Co.

301 **Dust Recovery** — "Engineered Efficiency in Dust Collection and Recovery," 36 pp, discusses industrial dust recovery from standpoints of nuisance abatement, waste avoidance, hazard elimination. Explains what dust is and how company's equipment handles it. Shows effect of variation in particle size distribution and

PUMP THESE LIQUIDS

Acids	Linseed Oil
Ammonia	Lime Water
Asphalt	Lye
Alcohol	Lubricating Oils
Brines	Milk
Benzine	Molasses
Bleaches	Naphtha
Blood	Mineral Oils
Cream	Olive Oil
Chocolate	Paints
Caustics	Paint Oils
Chemicals	Petroleum
Coal Tar	Pitch
Creosote	Plastics
Dishwater	Printing Inks
Drugs	Road Oils
Dyes	Soap Liquors
Ether	Starch
Fuel Oils	Sizing Liquids
Food Products	Soy Bean Oil
Gasoline	Syrups
Glycerin	Tar
Glue	Tomato Juice
Glucose	Turpentine
Grape Juice	Varnish
Hot Oils	Vegetable Oils
Juices	Viscose
Kerosene	Water
Lacquer	Wine
Lard	Yeast

VIKING

The Pump That Is SO RIGHT for SO MANY Pumping Jobs

The fast, self priming . . . the positive, steady discharge . . . the adaptation to thin or viscous liquids, makes the Viking pump SO RIGHT for SO MANY pumping jobs.

The many sizes are built in a multitude of models and styles. Each is designed for the particular pumping job. It is built to meet your requirements, completely.

Learn more of these outstanding facts. Send for your free copy of bulletin 51SZ today.

FIG 12

VIKING AN HONORED NAME IN PUMPING

Ask For Catalog 51 SZ

Viking Pump Company Cedar Falls, Iowa

Molded On Rubber Tired Wheels

THOMAS MAKES 1000 DIFFERENT KINDS OF CASTERS & WHEELS

Write for complete catalog and price list

Pneumatic & Semi-Pneumatic Casters

Swivel Casters

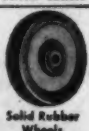
Stem Plate Casters

Cone Stem Swivel Casters

Semi-Steel Wheels

Extra Heavy Duty Wheels

"Resonite" Wheels



Solid Rubber Wheels

Pneumatic and Cushion Wheels

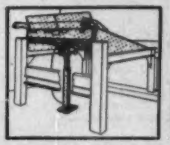
THOMAS TRUCK & CASTER CO.

170 MISSISSIPPI RIVER KEOKUK, IOWA

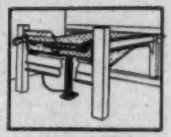
ADJUST YOUR DOCK *INSTANTLY* TO ANY TRUCK HEIGHT

ADJUST-A-DOCKS

- *TRIPLE YOUR DOCK CAPACITY*
- *SAVE TIME AND LABOR*
- *PAY FOR THEMSELVES IN 30 DAYS*



RAISED



LOWERED

ADJUST-A-DOCKS pay for themselves quickly in shorter handling time, less breakage, and increase usable dock area.

Instant push-button control hydraulically raises or lowers the **ADJUST-A-DOCK** to truck bed height. Rounded steel arms then automatically float the dock at truck level.

If the truck accidentally moves away, automatic safety control prevents the **ADJUST-A-DOCK** from falling—even with a full load. When leveled with dock floor the **ADJUST-A-DOCK** can support heavy stored loads.

ADJUST-A-DOCKS are easily installed—eliminate dangerous dock plates. Tell us your requirements and we'll give you complete information—no obligation.

WRITE TODAY
for free bulletin giving complete information.

ROWE METHODS, INC. 1737 EAST 25th STREET CLEVELAND 14, OHIO

VISIT OUR BOOTH No. 839—MATERIALS HANDLING EXPOSITION, CHICAGO, APRIL 30 — MAY 4

TORNADO®

portable, electric blower

Now you can get fast, thorough, safe cleaning of motors, machinery, equipment and critical areas. The best and simplest way to remove dirt, dust, lint and oily fuzz.

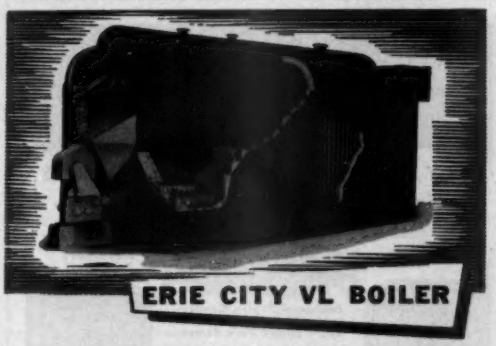
powerful blast of dry air!

FREE! Bulletin 579

Tornado offers 4 industrial models and 3 special models. Many attachments for unusual cleaning requirements. Free demonstration—representatives in principal cities.

BREUER ELECTRIC MFG. CO

• DEPT. P-4 • 5100 N. RAVENSWOOD AVE. • CHICAGO 40, ILL. •



ERIE CITY VL BOILER

Here is combined an Erie City 2 Drum Water Tube Boiler-Furnace—side Water Cooling and Refractory in a compact low headroom unit, fired by Erie City stoker. V L's may be shipped assembled in sizes to 300 HP. Larger sizes for field erection. Write for Bulletin SB-24 for a complete description of this compact and economical water tube boiler.

ERIE CITY IRON WORKS • ERIE, PA.
1422 East Avenue

ERIE CITY

Complete Steam Generators • Type C 3-Drum Boilers • Type VL 2-Drum Boilers • The "Economic" Boiler with or without Water Walls • Welded H.R.T. and Vertical Boilers • Steel Heating Boilers • Pulverizers • Underfeed and Spreader Stokers

specific gravity of dust on efficiency. Buell Engineering Co., Inc.

302 Dust Control Technology—Detailed selection, operation, and maintenance data are contained in this 50-pp digest-size book, "Industrial Dust Control Through Exhaust Systems." Treats exhaust hoods, piping systems, dust collecting equipment; exhausters and drives. Lists basic methods of dust control and analyzes elements of exhaust systems. Discusses control of air movements, recommended hood and enclosure design, exhaust air velocity and volume and rules for installing system piping. Presents methods for testing and evaluating exhaust system effectiveness, recommendations on periodic check-ups. Pangborn Corp.

WATER CONDITIONING

303 Zeolite Softeners for Small Plants—Publication 4505 describes junior industrial type zeolite softening equipment for plants requiring less than 100 gpm of softened water. Discusses single and double units, exchange materials. Cochrane Corp.

304 For Conductometric Determination of Solids—A quick and simple method for determining solids content of boiler water or condensate is explained and illustrated in Bulletin 2RE50. Test procedure utilizes conductivity meter in conjunction with a cell, dial thermometer, conductivity cylinder and reagent. Hall Laboratories, Inc.

305 Scale Formation—This is a technical article on mechanics of scale formation, corrosion, other attacks on boiler metals, and how de-scaling unit works to correct, eliminate them. Butler Engineering Co.

PACKINGS, SEALS

306 Data on Packings — Form 428 is a collection of bulletins on flexible metallic packing, semi-metallic packing, rotary mechanical seal, oil pressure system and steel packing tools. Includes engineering data. Durametallic Corp.

307 Oil Seals and How to Use Them — Bulletin PK-46A, a 16-pp handbook, provides photos showing where to use oil seals and how to install them. Drawings show how lip and heel construction of these non-metallic seals can be varied. Johns-Manville.

308 Handbook on Mechanical Packings—This 32-pp booklet describes mechanical packings, including a process packing which is self-forming, self-lubricating, self-sealing. Illustrated, provides ordering, application information; includes recommendation chart. Packing Div., Flexrock Co.

309 Long Wearing Piston Packing — Form 4502, 8 pp, stresses use of company's composition cups for packing the pistons of air and hydraulic cylinders and reciprocating pumps. Engineering information covers properties, textures available, temperature and pressure data, sizes. Darling Valve & Mfg. Co.

310 Mechanical Seals for Rotary Shafts —Illustrated with cutaway drawings, this 12-pp booklet covers seals of the positive, chevron, and o-ring types, giving specifications. Shows typical applications. Also discusses special uses, installation of the seals. The Garlock Packing Co.

FUELS, LUBRICATION

311 Viscosity of Fluids—The larger significance of viscosity is discussed in Nos. 5 and 6, Vol. 36 of Lubrication, a technical publication. Illustrates simplest conception of streamline flow between two surfaces having relative motion. Shows how viscosity is measured. The Texas Co.

312 The Answers on Turbine Oil — This handy 2-pp booklet answers the questions: What causes deposits of sludge? What causes acidity increase? What causes corrosion in turbines? Explanations are brief, illustrated. Standard Oil Co. (Indiana)

314 Lubricant Data Book—This pocket-size 56-pp booklet gives product information and principal uses of approximately 40 lubricants of both grease and fluid types, and general directions for proper application. Discusses lubricant requirements of equipment in 25 major industries —from bottling plants to sawmills. Also discusses use of a heavy-duty motor oil. Lubriplate Div., Fiske Brothers Refining Co.

TOOLS, WELDING

315 Tool Catalog — Hand and power tools, tool sets, kits and related equipment are presented in 110-p Catalog T. Includes descriptive, ordering and application data. Snap-On Tools Corp.

316 Welding Electrode Ordering Guide—Pocket-size Catalog R7-7 on electrodes for hard surfacing and for welding stainless, alloy and mild steels, includes operating characteristics, current ranges, tensile strengths, polarity. Harnischfeger Corp.

317 Pipe Tools, All Kinds—Catalog 50, 36 pp, covers pipe tools, machines, power drives, threading oil. Products illustrated and operational advantages explained. Includes ordering specifications, price list. Beaver Pipe Tools, Inc.

OTHER EQUIPMENT

318 Modern Steam Engines—Stressing value of "by-product" power, Bulletin 308 describes vertical steam engines of both throttling and automatic governor types. Sectional drawings accompany engineering data, discussion of construction, installations photos. Troy Engine & Machine Co.

319 Group Washing Equipment—Washfountains designed for modern group washing requirements for industrial plants and institutions are described and pictured in Bulletin D-766. Hand- and foot-controlled models included, available materials listed. Also pictures multi-stall showers. Bradley Washfountain Co.

APCO *Packaged* CONDENSATION RETURN UNITS

for the SMALL LOW PRESSURE JOBS

10 to 40 lbs. with 8, 15, 30 Gallon Receivers

Packaged Duplex Condensation Return Unit with No. 4 Series Apco Pumps.

Start saving valuable heat units with APCO Square Tank Units. Built to meet demand for a smaller unit with the superb performance of our larger units. Remember, the Pumps are Apcos. No Vapor Binding — Special Provision for Expansion and Contraction — No Frictional Wear within pump. Thus, ECONOMY.

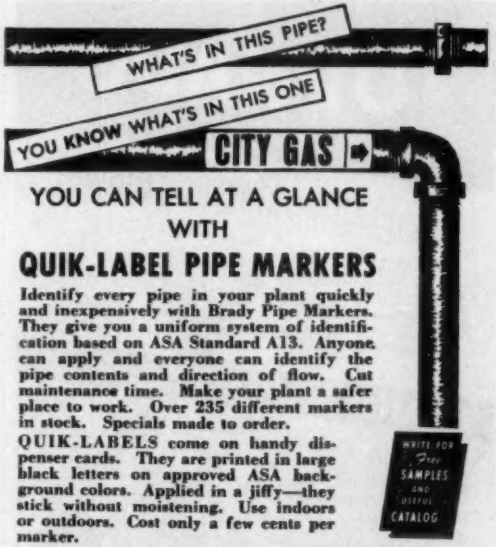
Write for Bulletin 113-ST

DISTRIBUTORS IN PRINCIPAL CITIES

AURORA Always PUMPS

AURORA PUMP COMPANY

44 Loucks Street, AURORA, ILLINOIS



YOU CAN TELL AT A GLANCE WITH

QUIK-LABEL PIPE MARKERS

Identify every pipe in your plant quickly and inexpensively with Brady Pipe Markers. They give you a uniform system of identification based on ASA Standard A13. Anyone can apply and everyone can identify the pipe contents and direction of flow. Cut maintenance time. Make your plant a safer place to work. Over 235 different markers in stock. Specials made to order.

QUIK-LABELS come on handy dispenser cards. They are printed in large black letters on approved ASA background colors. Applied in a jiffy—they stick without moistening. Use indoors or outdoors. Cost only a few cents per marker.

WRITE FOR Free SAMPLES AND USEFUL CATALOG

DISTRIBUTORS IN OVER 125 PRINCIPAL CITIES

MANUFACTURERS OF SELF-STICKING PRODUCTS

PIPE MARKERS · SAFETY SIGNS · PRINTED "SEETON-TAPE" · MARKERS & STRINGERS

W. H. BRADY COMPANY

1634 E. SPRING STREET • CHIPPEWA FALLS, WIS.

STOP BASEMENT WALL LEAKS

Smooth-On No. 7 Iron Cement stops your basement wall and floor leaks. You can apply Smooth-On No. 7 with a trowel or stiff brush, to cracks, holes, porous spots or seams in concrete, brick, stonewalls or floors. This effective Smooth-On Cement will stay in place, because it expands slightly as it sets. You can also use Smooth-On No. 7 to stop leaks in tanks, cisterns, pools, troughs, fountains, etc. Use it too, to seal openings where piping passes through walls. Sold in 1, 5, 20, and 100 lb. sizes.

FREE Repair Handbook 40 pages packed with helpful suggestions for repairs to equipment and piping, in the shop, around the home and car. Also ask for Leaflet describing the uses of Smooth-On No. 7. Write today.

Smooth-On Manufacturing Company, Dept. 85
570 Communipaw Ave., Jersey City 4, N. J.

Do it with **SMOOTH-ON**
NO. 7 IRON CEMENT

WISSCO BELTS

step up production – cut down handling costs

Faster, uninterrupted production . . . in heat treatment of metals, glass and ceramics; and in processing of foods, rubber, textiles, veneers and numerous other products . . . is assured with dependable, long-wearing Wissco Belts.

Fabricated in special weaves and alloys—with or without chain edges—Wissco Metal Processing Belts have high resistance to corrosion, abrasion and temperature extremes.

Write for illustrated booklet describing the many uses and cost-cutting advantages of Wissco Belts.

WISSCO METAL PROCESSING BELTS CF&I

A PRODUCT OF WICKWIRE SPENCER STEEL DIVISION OF THE COLORADO FUEL & IRON CORPORATION
Sales Office and Plant—56 Sterling Street, Clinton, Massachusetts
Executive Office—500 Fifth Avenue, New York 18, New York
Sales Offices—Atlanta • Boston • Buffalo • Chicago • Denver • Detroit • New York • Philadelphia
Pacific Coast—The California Wire Cloth Corporation, Oakland 6, California

NEW
Sky-Blast
POWER ROOF VENTILATOR

FOR POSITIVE ECONOMICAL VENTILATION

In roof ventilation, you need air movement—and plenty of it! The new Propellair Sky-Blast gives you powerful air movement at minimum cost. With capacities from 2800 to 78,800 CFM, its performance is amazing! Here are a few of its advantages:

Built to do a job

Sky-Blast design is strictly functional—no frills, no gadgets. A powerful suction sweeps up heat, moisture, dust fumes . . . and a strong exhaust shoots them high into the outside air. Performance is constant, regardless of wind direction or velocity!

Many new design features

You get many engineering refinements in the new Sky-Blast . . . including automatic butterfly dampers that will not leak, streamlined wind guard, and non-clogging rainshed. The heart of the Sky-Blast is the famous cast-aluminum airfoil propeller—powered by a fully enclosed, weather-resistant R & M motor.

Simplest installation

Sky-Blast units are designed for easy mounting on any roof. Their symmetrical, low silhouette gives pleasing appearance, low wind resistance, low roof stresses. Heavy-gauge, curb base gives lifetime support.

Write for catalog P-680-E—Propellair has fans of types, sizes and capacities to meet almost every industrial need. Let us study your air movement problem and submit recommendations. No cost or obligation.

PROPELLAIR
DIVISION OF ROBBINS & MYERS, INC
SPRINGFIELD · OHIO

320 Visual Planning Equipment — The importance, application and cost of three-dimensional planning materials are presented in this file of data. Tells how planning is basis for manufacturing cost reductions. Includes photos, prices. "Visual" Planning Equipment Co., Inc.

321 Fundamentals of Hydraulics—Technical Bulletin B-4 is a 44-pp guidebook covering essential information on hydraulic systems, maintenance, trouble-shooting and selection of proper fluids. Besides offering well-organized reference data for plant engineers, this book is suggested as a training manual for maintenance personnel. It features phantom and cutaway drawings showing functions of basic types of valves, pumps, hydraulic motors, torque converters. Sun Oil Co.

322 Plumbing and Heating Supplies—Edition F is a 118-pp catalog listing over 2500 repair parts and precision tools for maintenance of all types of plumbing fixtures. Fully illustrated, covers replacement parts used in faucets, shower mixing valves, toilet tanks, flush valves, and plumbing connections for basin and sink fixtures. Includes products for plumbing fixtures. J. A. Sexauer Mfg. Co., Inc.

323 Elevated Steel Tanks—Welded steel tanks with elipsoidal bottoms and roofs are presented in this 24-pp booklet as an economical means of increasing plant water storage capacity, maintaining uniform pressure, meeting peak loads and reducing pump costs. Full color illustrations show seven models. Location of tanks, distributed storage, fire flow requirements, dual storage piping, accessories, maintenance are discussed. Capacity table included. Chicago Bridge & Iron Co.

324 Packaged Generators—Bulletin SB-38 introduces company's new Keystone model. Photos and sketches show complete unit, pressure element and details of its compact design. Text covers advantages of the two-drum water boiler, three-pass gas travel, automatic gas or oil burner. Dimensions and capacities listed, equipment described. Erie City Iron Works.

325 Vacuum Blasting — The efficiency and economy of vacuum blasting equipment for cleaning of equipment and other maintenance jobs, weld preparation, and conveying of granular material, is presented in this bulletin. A flow chart illustrates operation of a complete vacuum blasting unit-gun, generator, separator, dust collector. Vacu-Blast Co., Inc.

327 Neoprene Goes to Work—Eight-pp Bulletin A-18 discusses the properties of manufacturer's Neoprene, showing how these properties are utilized in products made from this chemical rubber. Text covers its toughness, hardness range, air retention, performance under load, at extreme temperatures, flame resistance, chemical resistance. Tables show effect of organic and inorganic chemicals on Neoprene. Rubber Chemicals Div., E. I. du Pont de Nemours & Co.

328 Unit Heater Selection — Sixty-pp Bulletin DS-327B tells how to choose propeller-type unit heaters, where to locate them and how to install them. Shows how manufacturer's heaters are constructed, explaining design features of diffusers, coils. Covers heaters for ventilation with duct work, piping details, controls, maintenance tips, steam and hot water capacities, giving helpful engineering information. Also provides roughing-in data, mechanical and architectural specifications. The Trane Co.

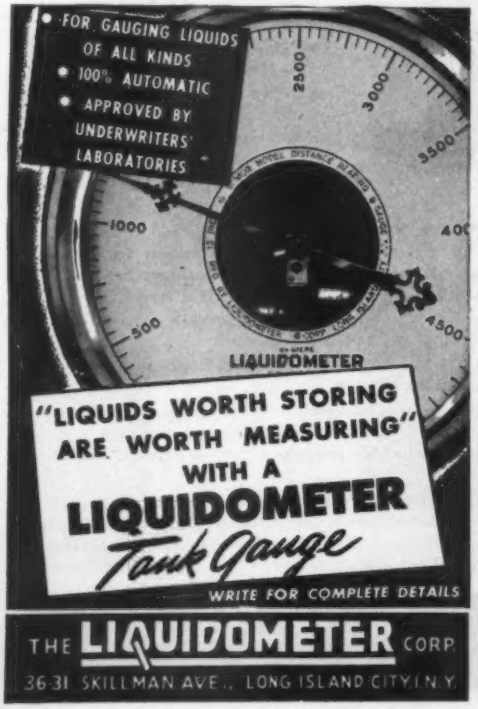
329 Four Handy Guides for Plant Engineers—Bulletin 20B6051J, 12 pp, offers data on figuring V-belt drives; Bulletin 51B-6025K, 12 pp, for quick selection of electric motors; Bulletin 52B6059E, 16 pp, for selection of centrifugal pumps, and Bulletin 25B6051B, for power generation, distribution and control equipment. Specify booklets wanted. Allis-Chalmers Mfg. Co.

LIGHT INTENSIFIER

Gives more light without using more wattage

Those who use precision instruments or do other exacting work will find this handy device a means of reducing eyestrain, according to manufacturer, and a saver of electricity, too. It's a specially designed lens encircled by a beam-directing metal casing. You snap it on a 40- to 100-w bulb and adjust it so the concentrated beam of light is where you want it. Its use is said to triple the power of a 50-w bulb, enabling it to give more

light than a 100-w bulb without the attachment. Costs $1.00. Light Intensifier Co., 1411 Crane, Detroit 14, Mich.



WALLMASTER

SAVES 75% of your cleaning costs!

WALLMASTER, the scientific machine method of chemically cleaning painted walls and ceilings, provides year-round sanitation at lowest possible cost. WALLMASTER saves thousands of maintenance dollars each year, and actually pays for itself in the very first few months' operation!

See HANDEASY, remarkable new attachment which cleans painted rough brick, pipes, and patterned ceilings by machine . . . with controlled moisture!

Write today for a free demonstration at your plant.

QUAKER MAINTENANCE COMPANY, INC.
124 WEST 18TH ST. NEW YORK 11, N. Y.

INCREASE PRODUCTION • SAVE HOSE!

Wayne **HOSE REELS**

lower cost—
greater convenience—
prevent accidents

Convenient bench reel . . . mounts anywhere. Combination air supply and tool suspension. Saves costly hose.

Coolant hose automatically [illegible] tool with constant tension

HERE'S a useful, time-saving application of Wayne Hose Reels to supply cooling liquids in machine operations. The hose automatically extends or retracts, following the tool. Operator does better work, with full attention to tool. There are no loose hose loops to cause accidents. Wayne Hose Reels are simple, neat efficient and save more hose in a few months time than they cost. They are also used for hand air tools, providing both suspension and air supply. Convenient, speed up production, and keep tools off bench, yet in convenient reach. Write for bulletin.

HOSE REEL DIVISION

THE WAYNE PUMP COMPANY • FORT WAYNE, INDIANA

WAYNE INDUSTRIAL HOSE REELS

FOR AIR, WATER, FLUID LUBRICANTS AND COOLANTS

Butler De-Scalers

END Expensive Rust, Scale and Corrosion

Satisfactory water correction can be obtained anywhere with De-Scalers; so, if you have a water correction problem, and if you want the maximum of protection and assured satisfaction, use Butler De-Scalers in your boilers and hot water tanks.

Write today for Bulletin IND.

BUTLER DE-SCALER CORP.

P. O. BOX 4943, JACKSONVILLE 1, FLORIDA

ONE PACKING *for* MOST APPLICATIONS

FLEXROCK PROCESS PACKING

SAVES TIME! SAVES MONEY! REDUCES STOCK!

One type—in most cases one size of new FLEXROCK PROCESS PACKING will answer most packing needs for the average plant . . . eliminates stocking of countless varieties. With only nominal gland pressure, FLEXROCK PROCESS PACKING forms itself into a leak-proof, self-lubricating seal the exact size and shape of any pump stuffing box or fitting into which it is placed. Available in coil or spiral form, jacketed or unjacketed. Write for FREE Catalog.

MAIL THIS COUPON

FLEXROCK COMPANY, Packing Division
3615 Cuthbert St., Phila. 4, Pa.

I am interested in FLEXROCK PROCESS PACKING. Please send Catalog. No obligation.

Name .....

Company .....

City ..... *Zone*..... *State* .....

ADVERTISERS IN THIS ISSUE

When writing to advertisers for information please tell them you saw their ad in Plant Engineering—or use the handy post card on "Bulletins" insert in this issue.

Adam Electric Co., Frank 47
Agency—George A. Marklin and Associates
Allis-Chalmers Mfg. Co. ..... Back Cover
Agency—Compton Advertising, Inc.
American Blower Corporation 16
Agency—Brooke, Smith, French & Dorrance, Inc.
American Chain & Cable 90
Agency—Reincke, Meyer & Finn
American Engineering Co. 125
Agency—Beatty and Oliver, Inc.
American Monorail Co., The 36
Agency—The Bayless-Kerr Company
American Structural Products Co. 45
Agency—J. Walter Thompson Company
Anderson Co., The V. D. 131
Agency—Will, Incorporated
Armstrong Bros. Tool Co. 122
Agency—Ross Llewellyn, Inc.
Armstrong Machine Works 5
Agency—Russell T. Gray, Inc.
Aurora Pump Company 134
Agency—Fred A. Hinrichsen Advertising Agency
Barber-Colman Company 40, 131
Agency—Cummins, Brand & McPherson
Barrett Division, Allied Chemical & Dye Corporation ... 21
Agency—McCann-Erickson, Inc.
Bassick Company, The 53
Agency—James Thomas Chirurg Company
Beaver Pipe Tools, Inc. 116
Agency—Meek and Thomas, Inc.
Black, Sivalls & Bryson, Inc. 51
Agency—The Potts-Turnbull Company
Blackhawk Mfg. Co. 6-7
Agency—Klau-Van Pietersom-Dunlap Associates, Inc.
Boston Woven Hose & Rubber Company 49
Agency—Sutherland-Abbott
Bradley Washfountain Co. 30
Agency—Kirkgasser-Drew
Brady Company, W. H. 134
Agency—Ervin R. Abramson
Breuer Electric Mfg. Co., Inc. 130, 133
Agency—Allan Marin & Associates
Buda Company, The 43
Agency—Ross Llewellyn Inc.
BullDog Electric Products Company 87
Agency—Brooke, Smith, French & Dorrance, Inc.
Butler De-Scaler Corp. 137
Byron-Jackson Co. 115
Agency—The Martin R. Klitten Company, Inc.
Chicago Bridge & Iron Company 110
Agency—Russell T. Gray, Inc.
Chiksan Company 54
Agency—Roy F. Irvin
Clarage Fan Company 48
Agency—William J. Williams
Cleveland Crane & Engineering Co., The .. Inside Back Cover
Cochrane Corporation 122
Agency—Willard G. Myers Advertising Agency
Colorado Fuel & Iron Corporation, The
Wickwire Spencer Steel Division 130, 135
Agency—Doyle, Kitchen & McCormick, Inc.
Combustion Engineering-Superheater, Inc. 95
Agency—G. M. Basford Company
Crane Co. 14
Agency—The Buchen Company
Cullen-Friestedt Co. 126
Agency—Ross Llewellyn Inc.
Darling Valve & Manufacturing Co. 94
Agency—The Griswold-Eshleman Co.
Dayton Rubber Company 39
Agency—Geyer, Newell & Ganger, Inc.
De Laval Steam Turbine Co. 56
Agency—Geo. H. Gibson Co.
Dempster Brothers 10
Agency—Charles S. Kane Co.
Diamond Chain Company, Inc. 12
Agency—Kirkgasser-Drew
Dollinger Corporation 113
Agency—Casler, Hempstead & Hanford, Inc.
du Pont de Nemours & Co., E. I. 85
Agency—Batten, Barton, Durstine & Osborn
Elliott Company 8-9
Agency—Peterson & Kempner, Inc.
Erie City Iron Works 133
Agency—Davies & McKinney
Eriez Manufacturing Company 105
Agency—John Mather Lupton Company
Federated Metals Division, American Smelting
and Refining Company 98
Agency—John Mather Lupton Company
Fenestra Building Products 33
Agency—Fuller & Smith & Ross, Inc.
Flexrock Company 128, 137
Agency—Walter S. Chittick Company
Fuller Company 97
Agency—O. S. Tyson and Company, Inc.
Gates Rubber Company, The 17
Agency—Cloyd F. Woolley, Inc.
General Electric Company 15, 27, 57
Agency—G. M. Basford Company
Goodrich Co., The B. F. 3
Agency—The Griswold-Eshleman Co.
Gould Pumps, Inc. 32
Agency—Charles L. Rumrill & Co., Inc.
Green, Tweed & Co. 124
Agency—Raf Advertising Incorporated
Greenlee Tool Co. 128
Agency—Howard H. Monk and Associates
Grinnell Company, Inc. 127
Agency—Horton-Noyes Company
Gulf Oil Corporation 119
Agency—Young & Rubicam, Inc.
Harnischfeger Corporation 103
Agency—The Buchen Company
ILG Electric Ventilating Co. 99
Agency—Howard H. Monk and Associates
Jeffrey Mfg. Co., The 18
Agency—Byer & Bowman Advertising Agency
Johns-Manville 96
Agency—J. Walter Thompson Company
Joy Mfg. Co. 111
Agency—Walker & Downing
Kenco, Inc. 50
Agency—The Lee Donnelley Co.
Koppers Co., Inc., Tar Products Division 93
Agency—Batten, Barton, Durstine & Osborn, Inc.
Korb-Pettit 116
Agency—Carl Mason Craig
Kuljian Corporation, The 117
Agency—Al Paul Lefton Company, Inc.
Lewis-Shepard Products, Inc. 112
Agency—Edmund S. Whitten, Inc.
Liquidometer Corp., The 136
Agency—Lucerna Company, The
Lovejoy Flexible Coupling Co. 139
Agency—Symonds, MacKenzie & Co., Inc.
Lubriplate Division, Fiske Brothers Refining Co. 129
Agency—E. M. Freystadt Associates, Inc.
Mortell Co., J. W. 129
Agency—Arthur C. Barnett
Niagara Blower Company 100
Agency—The Moss-Chase Company
Nicholson & Co., W. H. 126
Agency—Wilbur A. Myers
Norgren Co., C. A. 114
Agency—Gray & Co., Inc.
Ohio Injector Co. ..... Inside Front Cover
Agency—Fuller & Smith & Ross, Inc.
Osborn Manufacturing Company, The 101
Agency—The Griswold-Eshleman Co.
Owatonna Tool Co. 29
Agency—Melamed-Hobbs, Inc.
Pittsburgh Coke & Chemical Co. 104
Agency—Walker & Downing

Powell Co., The Wm. 91
Agency—Advertisers' Agency, Inc.

Proto Tools 4
Agency—Willard G. Gregory & Company

Pyramid Instrument Corp. 121
Agency—Reiss Advertising

Quaker Maintenance Company, Inc. 136

Ramset Fasteners, Inc. 46
Agency—Fuller & Smith & Ross, Inc.

Reeves Pulley Company 23
Agency—Caldwell, Larkin & Company, Inc.

Robbins & Myers, Inc. 26
Agency—Erwin, Wasey & Company, Ltd.

Robbins & Myers, Inc. 135
Agency—Greenhaw & Rush, Inc.

Rohm & Haas Company 13
Agency—John Falkner Arndt & Company, Inc.

Rowe Methods, Inc. 133
Agency—Stedfeld & Byrne, Inc.

Sarco Company, Inc. 22
Agency—Gus Binz Associates

Shepard Niles Crane & Hoist Corporation 34
Agency—Baker, Jones, Hausauer, Inc.

SKF Industries, Inc. 81
Agency—O. S. Tyson and Company, Inc.

Sly Mfg. Co., The W. W. 120
Agency—The Bayless-Kerr Company

Smooth-On Mfg. Co. 135
Agency—Michel-Cather, Inc.

Snap-On Tools Corporation 52
Agency—The Cramer-Krasselt Co.

Speer Carbon Company 92
Agency—O. S. Tyson and Company, Inc.

Spencer Turbine Co., The 28
Agency—W. L. Towne Advertising

Standard Oil Co., (Indiana) 55
Agency—McCann-Erickson, Inc.

Standard Pressed Steel Co. 118
Agency—R. E. Lovekin Corp.

Standard Stoker Company, Inc., The 42
Agency—Davies & McKinney

Sun Oil Company 35
Agency—Gray & Rogers

Superior Combustion Industries, Inc. 123
Agency—Charles H. Davis

Swartwout Co., The 102
Agency—Carr Liggett Advertising, Inc.

Thomas Truck & Caster Co. 132
Agency—The Biddle Company

Trane Co., The 109
Agency—Tatham-Laird, Inc.

Tremco Manufacturing Co. 118
Agency—The Griswold-Eshleman Co.

Troy Engine & Machine Company 124
Agency—Sanger-Funnell, Inc.

Trumbull Electric Manufacturing Company, The 41
Agency—James Thomas Chirurg Co.

Tube Turns, Inc. 19-20
Agency—The Griswold-Eshleman Co.

Viking Pump Company 132
Agency—Walter E. Battenfield Co.

Wagner Electric Corporation 25
Agency—Arthur R. Mogge, Incorporated

Walworth 89
Agency—G. M. Basford Company

Wayne Pump Co., The 129, 137
Agency—Bonsib Advertising Agency

Westinghouse Electric Corporation 31, 83
Agency—Fuller & Smith & Ross, Inc.

Weston Electrical Instrument Corporation 106
Agency—G. M. Basford Company

Wickwire Spencer Steel Division of
The Colorado Fuel & Iron Corporation 130, 135
Agency—Doyle, Kitchen & McCormick, Inc.

Worthington Pump & Machinery Corp. 11
Agency—James Thomas Chirurg Co.

Yarnall-Waring Company 58
Agency—Michener & Holland

ON YOUR PRODUCTS or IN YOUR PLANT

LOVEJOY *Variable* SPEED CONTROL

INCREASES PRODUCTION

With "finger-tip" control, machines can be speeded up to increase production . . . adjusted to the speed ability of the operator . . . corrected to size or density of parts or stock—temperature or humidity.

REDUCES SHUT-DOWNS

With Lovejoy Variable Speed Control, costly shut-downs are eliminated in the process of changing the speed of the machine to meet varying conditions.

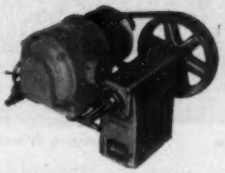
IMPROVES YOUR PRODUCT

Lovejoy Variable Speed Control permits the easy speed correction of your machines to compensate for varying conditions. The results . . . better products and fewer rejects.

INCREASES SALES

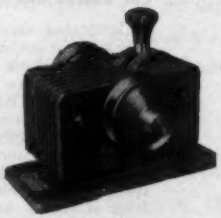
The machines you manufacture, when equipped with Lovejoy Variable Speed Control, have that "extra" sales appeal. Your customers appreciate this added advantage.

LOVEJOY VARIABLE SPEED PULLEY and ADJUSTABLE MOTOR BASE



Available for fractional to 8 H.P. drives and speed ratios up to 3 to 1.

LOVEJOY SELECT-O-SPEED TRANSMISSIONS



With lever on hand wheel control. Sizes from fractional to 7½ H.P., and speeds up to 10 to 1 ratio.

★ ★ ★

WRITE FOR FULLY ILLUSTRATED CATALOG AND ENGINEERING MANUAL

LOVEJOY FLEXIBLE COUPLING CO.

5088 W. LAKE ST., CHICAGO 44, ILL.

Also Mfrs. of Lovejoy L-R Flexible Couplings and Lovejoy Universal Joints

PLANT ENGINEERING

EDITORIAL STAFF

RICHARD H. MORRIS, *Editor*
T. E. HANSON, *Managing Editor*
R. L. MARINELLO, *Associate Editor*
C. R. EARLE, *Associate Editor*
M. E. HENIKEN, *Equipment Editor*
EARL NOREN, *Assistant Editor*
A. W. KRAMER, *Contributing Editor*
R. E. TURNER, *Consulting Editor*
JAMES E. WILCOX, *Staff Artist*

Published Monthly by
Technical Publishing Co.
110 S. Dearborn St., Chicago 3, Ill.

KINGSLEY L. RICE, *President*
EDWIN C. PROUTY, *Exec. Vice Pres.*
WALTER PAINTER, *Vice President*
EDWIN C. PROUTY, JR., *Secretary*
ARTHUR L. RICE, JR., *Treasurer*
RALPH E. TURNER, *Edit. Advisor*
JOHN O. AARVOLD, *Prod. Manager*

RICHARD M. WARD
Vice President in Charge of Sales

DISTRICT MANAGERS

CHICAGO: Arthur L. Rice, Jr.
John R. Morrison
110 S. Dearborn St., Chicago 3, Ill.
Phone: DEarborn 2-5446

NEW YORK: George L. Wright, Jr.
Oscar Wilds
Graybar Bldg., New York 17, N. Y.
Phone: Murray Hill 5-3779

PHILADELPHIA: Oscar Wilds
1235 Jericho Road, Abington, Pa.
Phone: Ogontz 7261W

CLEVELAND: Richard M. Ward
2945 Fairmount Blvd.
Cleveland Heights, Ohio
Fairmount 1-0616

PACIFIC COAST: McDonald-Thompson
Roy M. McDonald, Mgr.
625 Market St.
San Francisco 5, Cal.
Phone: Yukon 6-0647

Edwin T. Thompson
3727 West Sixth Street
Los Angeles 5, Calif.
Phone: Dunkirk 7-5391

Harry Abacy, Mgr.
Terminal Sales Bldg.
Seattle 1, Wash.
Phone: Main 3860

SOUTHWEST: McDonald-Thompson
Richard C. Wipperman
McDonald-Thompson
1118 Odeans Drive
Dallas 11, Texas
Phone: Winfield 4911

SERVICE OFFICES:
115 S.W. 4th Ave.
Portland 4, Ore.
Phone: Atwater 7401

417 Railway Exchange Bldg.
Denver 2, Colo.
Phone: Main 2733

ABC

Subscription Information—Published Monthly. Prices: United States and Possessions one year $10.00, Canada one year $11.00. Other countries one year $12.00. Single copies $1.00.

Copyright, 1951 by Technical Publishing Co.

'ROUND ABOUT

with the editors

(Continued from page 4)

quirements. However, at the present time, only about 20 per cent of the corrugated now manufactured finds its way back as waste paper as compared to much higher percentages for old newspapers and magazines.

The supply of this vital raw material must be increased. Reports from many sections of the country are that industrial plants and retailers, while pressing for increased packaging supplies on one hand, are destroying the raw material from which this packaging is made.

If we are to meet civilian and war requirements for this packaging, destruction of this essential raw material must stop.

Please view this problem earnestly. Save, not burn or destroy, old corrugated boxes and Kraft paper and bags, and get them back to the mills via a waste paper dealer. *Frank Block, Director, Public Relations Committee, Midwest Consumers of Waste Paper.*

A New Plant Fire Brigade for Canada

IN MY estimation it (Plant Engineering) is the most informative magazine we receive . . . we are now contemplating reorganizing our fire brigade along lines outlined by Mr. Smith in his article "Plant Fire Brigades—Notes on Organization and Training," which appeared in the November 1950 issue. We feel certain that many ideas contained in future issues can be and will be applied to advantage in this plant.—*W. E. Trann, Assistant Superintendent, The Anthes-Imperial Co., Limited, Winnipeg.*

A Few Tips on Substitutes For Scarce and Critical Items

CRITICALLY short materials constitute a major problem for all industry, a problem which will become more acute as defense demands increase. The Munitions Board has underway an extensive program for ferreting out places where substitutes in defense department equipment and material will apply. Some of the findings applicable to general industrial activities are outlined below.

Examples of the types of materials which can be replaced by less critical substitutes, as well as process changes which might allow for conservation are: suitable plastics for metals; synthetic for natural rubber; pressed, powdered or extruded parts to replace forged parts; printed electronic circuits instead of wired circuits; paints or other protective coatings instead of metal plating, and stamped parts instead of machined parts.

Conservation is also possible through redesign of end items to allow for less dependence on critically-short materials. Such raw materials as aluminum, chromium, lead, rubber, tin, wool and zinc are examples. Each one is currently being stockpiled by the Munitions Board against expected short supply in the event of full mobilization.

Nickel and chromium are used extensively in alloy steels, but redesign of equipment may allow for use of less of these steels. Studies in titanium, one of the most abundant elements, may reveal possibilities for alloy substitutions.

Where Materials Handling Fits in the Plant Engineer's Job

RECENTLY we made a survey of a dozen plant engineers in the Chicago territory. The average time spent on materials handling problems by these engineers averaged a little over 10 percent. This ranged from a low of 3 percent in a dairy plant to a maximum of 30 percent in a paper converting mill.

The survey covered a dozen different industries as follows: Foundry, 10 percent; food processing, 8 to 10 percent; cosmetics, 20 percent; paint, 7.5 percent; paper converting, 20 to 30 percent; general machinery manufacture, 8 to 10 percent; grocery warehouse, 5 percent; milk plant, 3 percent; shoe factory, 5 percent; stove manufacturer, 15 to 20 percent; bakery, 5 percent, and retail store, 6 percent.

His Majesty's Government Invites Us to the British Industries Fair

WE HAVE JUST been flattered by a personal invitation from His Majesty to attend the 1951 British Industries Fair to be staged in London and Birmingham, England, from the 30th of April until the 11th of May. The BIF has a history of 35 years. The 1950 Show attracted nearly 20,000 overseas visitors—a record which is expected to be greatly exceeded this year.

More than one million square feet of exhibits will be represented with equipment from 490 firms. The heavy industries section will be held at Birmingham while the light industries will be presented in London in two sections, one at London's Earls Court and the other at Olympia Hall.

A free transportation link with buses will cover the short distance between Olympia and Earls Court in three minutes. Air taxi service between London and Birmingham is planned so that foreign visitors may visit and cover all three sections of the BIF in one day if they so desire.

Visit
CLEVELAND TRAMRAIL'S WORKING EXHIBIT
AT THE
MATERIALS HANDLING EXPOSITION
INTERNATIONAL AMPHITHEATRE
CHICAGO
APRIL 30 — MAY 4, 1951

Watch the automatic dispatch carrier start, stop, travel thru motor-driven switches, hoist, lower, all entirely unattended.

Inspect the new Tramrail Saf-Powr-Bar Conductor—an enclosed, insulated safety current conductor.

Try out the hand-propelled crane and feel for yourself its smooth easy operation.

See the new revolutionary automatic bridge interlock—you'll be delighted.

Check on the new Tramrail sliding shoe current collector —outlasts old wheel-type many times.

Operate the motor-driven crane and note its many points of superiority.

SEE THIS EXHIBIT
SPACE NUMBERS
508 AND 449
NORTH HALL

Because plants in nearly every conceivable industry are enjoying numerous advantages possible with Cleveland Tramrail, we feel certain you, too, will find many places where a hoist, a crane, or perhaps an extensive Tramrail System can be used profitably.

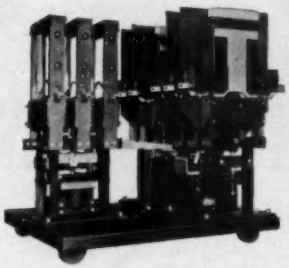
We invite and urge you to visit our display where you can study our equipment first-hand. You are going to pick up new valuable ideas on materials handling equipment which can mean much to your company and its production problems.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
7566 East 284th St. Wickliffe, Ohio

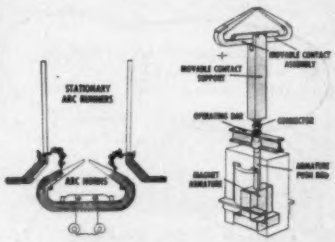
CLEVELAND TRAMRAIL

NEW TRUCK MOUNTED CONTACTORS

Cut Inspection Time!



THREE TYPE 256 AIR-BREAK CONTACTORS are mounted on a common base of heavy gauge metal . . . mechanically interlocked to provide reversing and dynamic braking for a synchronous motor. Base is on wheels — rolls into cubicle on guide rails. This truck mounting provides for quick, easy, unhindered inspection.



DOUBLE BREAK CONTACTS AND STRAIGHT LINE VERTICAL ACTION are combined in Allis-Chalmers Air-Break Contactors to eliminate maintenance factors like flexible contact leads, turning shafts and shaft bearings. These contactors are clean, easy to inspect and maintain . . . accessible in compact, attractive Type *H* Starters.

Now, for the first time, air contactors have been truck mounted! The contactors of this Synchronous Motor Controller are mounted on wheels—easy to remove through front or rear hinged doors. Just disconnect the power leads, unplug the control circuits and withdraw the contactors for easy inspection.

You save space! The starter is smaller because room for inspection isn't needed within the cubicle. Truck mounting is a feature of Type *H* Starters using three air contactors.

For *complete* control plus protection of squirrel-cage, synchronous and wound rotor motors up to 1500 hp at 5000 volts . . . all in one attractive steel cabinet that is compact and easy to install . . . specify Allis-Chalmers Type *H* Starters.

For full or reduced voltage starting, a single starter or an entire control group, check with your nearby A-C representative or send for bulletins 14B6410 and 14B7303.

A-3107

Allis-Chalmers
Milwaukee 1, Wis.

ALLIS-CHALMERS